STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

In the Matter of the Petition of
Public Service Electric and Gas Company
for Approval of the Next Phase of the Gas System
Modernization Program and Associated Cost Recovery
Mechanism ("GSMP II")

BPU Docket No. GR17070776

REBUTTAL TESTIMONY
OF
ANN E. BULKLEY

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

February 15, 2018

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Ann E. Bulkley. I am a Senior Vice President of Concentric Energy Advisors, Inc. ("Concentric"). My business address is 293 Boston Post Road West, Suite 500, Marlborough, Massachusetts 01752.

Q. On whose behalf are you submitting this testimony?

A. I am testifying on behalf of Public Service Electric and Gas Company ("Public Service" or the "Company"), a wholly-owned subsidiary of Public Service Enterprise Group, Inc. ("PSEG").

Q. Did you previously provide Direct Testimony in this proceeding?

A. No, I did not.

Q. What is the purpose of your Rebuttal Testimony?

A. The purpose of my Rebuttal Testimony is to respond to the Direct Testimony of Kevin W. O'Donnell on behalf of the Division of Rate Counsel ("Rate Counsel") as it relates to the appropriate return on common equity and capital structure for the next phase of Public Service's Gas System Modernization Program and Associated Cost Recovery Mechanism ("GSMP II").

Q. Are you sponsoring any exhibits as part of your Rebuttal Testimony?

A. My testimony in the January 2018 Public Service base rate case filing with the Board of Public Utilities ("Board") is attached and incorporated herein, as it is referenced throughout this

Rebuttal Testimony as Attachment AEB-GSMPII-1R. Also included in my Exhibit AEB-GSMPII-1R is the Direct Testimony of Michael Adams, which I reference and rely on in my base rate case testimony. In addition, I am sponsoring Schedules AEB-GSMPII-2R through AEB-GSMPII -4R.

II. EXECUTIVE SUMMARY

Q. Please summarize your key conclusions regarding the Direct Testimony of Mr. O'Donnell.

A. My key conclusions are as follows:

1) The authorized ROE must meet all three standards from Hope and Bluefield – financial integrity, capital attraction, and comparable returns. Mr. O'Donnell's ROE recommendation of 9.0 percent does not provide a return on equity that is comparable to those available to investors in companies with commensurate risk and is not sufficient to allow Public Service to compete for capital with other similar risk firms.

2) Mr. O'Donnell's ROE recommendation of 9.0 percent is 75 basis points lower than the currently authorized ROE for GSMP I, even though interest rates are approximately the same as in November 2015 when the 9.75 percent return was approved by the Board. Going-forward, interest rates and capital costs for utilities are expected to increase as the Federal Reserve tightens monetary policy and tax reform increases the federal budget deficit and places upward pressure on long-term rates.

3) The models used by Mr. O'Donnell to estimate the cost of equity for Public Service are based on inputs and assumptions that have been distorted by the recent low

interest rate environment. Mr. O'Donnell has not adjusted the inputs and assumptions in his DCF model and CAPM analysis to reflect forward-looking conditions in capital markets, or to take into consideration the effect of current conditions on the results of those models.

4) Mr. O'Donnell selects two proxy groups: a combination gas and electric utility proxy group and a gas distribution company proxy group. Public Service is a combination electric and gas distribution utility and raises capital and issues debt as a combination company. For that reason, a combination gas and electric utility proxy group should be used to estimate the cost of equity for Public Service.

5) Mr. O'Donnell's ROE recommendation is significantly lower than the Board has authorized in the past, including in several recent decisions for Atlantic City Electric and New Jersey Natural Gas. In fact, Mr. O'Donnell's ROE recommendation is also lower than the majority of authorized ROEs for electric and gas utilities across the country in 2016 and 2017. Such returns serve as important benchmarks for investors as they gauge their return requirements for regulated utilities such as Public Service. Yet, Mr. O'Donnell has provided no evidence or support to justify ignoring these benchmarks; rather he relies on the assertion that Public Service has lower business and financial risk than these other utilities to substantiate his recommendation.

6) Based on the analysis that I recently submitted on behalf of Public Service in the Company's base rate case filing in January 2018, I determined that the authorized

ROE for Public Service is within a range from 9.80 percent to 10.50 percent, and that 10.30 percent is a reasonable and appropriate return. Since the preparation of the analysis that formed the basis of my opinion in the Company's base rate filing, market conditions are even more supportive of the range and final recommendation in that case. Treasury bond yields have increased, and the utility stock index has seen a marked decline. This analysis fully supports the reasonableness of Public Service's requested continuation of the 9.75 percent ROE for the GSMP II until new rates are established in the Company's recently filed base rate case.

7) Mr. O'Donnell's proposed capital structure is comprised of 50 percent common equity. However, based on the capital structures of the operating companies held by the proxy group of combination gas and electric utilities, the equity ratio that has been proposed in the GSMP II proceeding of 51.2 percent is conservative. The equity ratio proposed by the Company in the base rate proceeding of 54.0 percent is fully supported.

III. FAIR RETURN STANDARD

Q. How does Mr. O'Donnell's ROE recommendation compare to the returns on equity authorized in other jurisdictions?

A. As shown in Chart 1, the vast majority of authorized ROEs for combination electric and gas utilities in 2016 and 2017 have been within a range from 9.50 percent to 10.50 percent. In that context, Mr. O'Donnell's 9.00 percent ROE recommendation does not meet the comparable return standard. Furthermore, the Board has recently issued decisions in rate cases in which the

authorized ROE was set at 9.75 percent for New Jersey Natural Gas in September 2016 and at 9.60 percent for Atlantic City Electric in September 2017. These recent ROEs have been adopted as part of settlements in recent rate proceedings. Even though these returns reflect the compromise of a settlement position, they are still consistent with the current authorized ROE of 9.75 percent for the GSMP.

Chart 1: Recently Authorized Electric and Natural Gas ROEs 2016-2017[1]

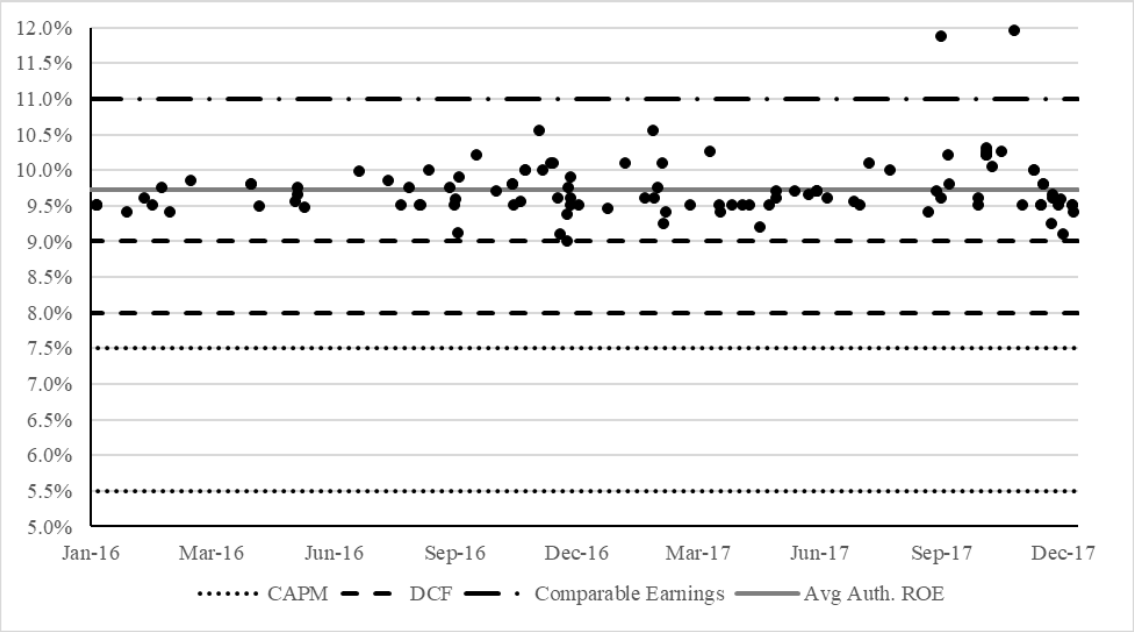

Chart 1 shows how the results of each of Mr. O'Donnell's methodologies compares to the recently authorized ROEs for electric and gas utilities across the U.S. The results demonstrate that only the Comparable Earnings methodology using combination electric and gas utilities

[1] Source: SNL Financial. The chart also shows the ranges of results for Mr. O'Donnell's DCF, CAPM, and Comparable Earnings analyses. Note that the dashed line at 9.0% represents both the high end of Mr. O'Donnell's DCF results and the low end of his Comparable Earnings results. Additionally, 9 cases from New York and 4 cases from Illinois have been excluded. The New York decisions included low authorized ROEs as part of multi-year rate settlements, and the Illinois decisions were the result of formula rate plans rather than an analysis based on proxy groups.

produces a reasonable return estimate that is consistent with ROE determinations in other jurisdictions. All of Mr. O'Donnell's other approaches produce results that are far too low to be considered reasonable. His ultimate recommendation of 9.00 percent is well below the authorized return on equity authorized by most regulatory commissions in the last several years (excluding New York).

Q. Has Mr. O'Donnell demonstrated that his recommended return meets the *Hope* and *Bluefield* standards?

A. No, he has not. As discussed in Attachment AEBGSMPII-1R, the *Hope* and *Bluefield* decisions form the legal basis for determining whether a return is just and reasonable.[2] These decisions set forth three standards, [3] each of which must be met in order for the return to be considered just and reasonable:

1) Comparable return standard
2) Financial integrity standard
3) Capital attraction standard

Mr. O'Donnell fails to demonstrate that his ROE recommendation of 9.0 percent offers equity investors a return that is comparable to those returns available to investors in alternative investments with commensurate risk. Furthermore, Mr. O'Donnell fails to demonstrate that his ROE recommendation would allow Public Service to raise equity capital on reasonable terms and conditions. It is important to recognize that equity investors face different risks associated with ownership of common equity including: 1) the risk that dividends on the common stock are not guaranteed, and 2) that they are the residual claimants on the Company's net income in the

[2] *Bluefield Water Works Co.* v. Publ. Serv. Comm'n., 262 U.S. 679 (1923); Federal Power Comm'n. v. *Hope Natural Gas Co.*, 320 U.S. 591 (1944).
[3] *Bluefield*, 262 U.S. at 692-93; *Hope*, 320 U.S., at 603.

event of bankruptcy. The comparable return and capital attraction standards are particularly important for the GSMP II because Public Service is making significant capital investments in order to upgrade and modernize its gas distribution system and related infrastructure.

IV. CAPITAL MARKET CONDITIONS AND EFFECT ON MODELS

Q. Please summarize Mr. O'Donnell's testimony regarding current capital market conditions and the impact on the cost of equity for Public Service.

A. According to Mr. O'Donnell, the cost of capital has decreased since Public Service's 9.75 percent authorized ROE for GSMP I was established in November 2015. As support for his position, Mr. O'Donnell summarizes the historical yields on Treasury bonds through 2017 and notes that the yields have declined by more than 20 basis points since the Board's decision approving the settlement in that proceeding.[4] Mr. O'Donnell also states that interest rates are likely to remain relatively low for an extended period.[5] On this basis, Mr. O'Donnell recommends a 75-basis point reduction in the authorized ROE for Public Service's GSMP program

Q. Do you agree with Mr. O'Donnell's assertion that market data suggests interest rates are likely to remain relatively low for an extended time period?

A. No, I do not. Chart 2 updates the Treasury bond yields presented by Mr. O'Donnell and also provides the recent historical data for the S&P Utilities Index and the S&P 500. As shown in Chart 2, the S&P Utilities Index has declined by approximately 14 percent since the House of Representatives approved the initial version of the tax reform legislation on November 16, 2017,

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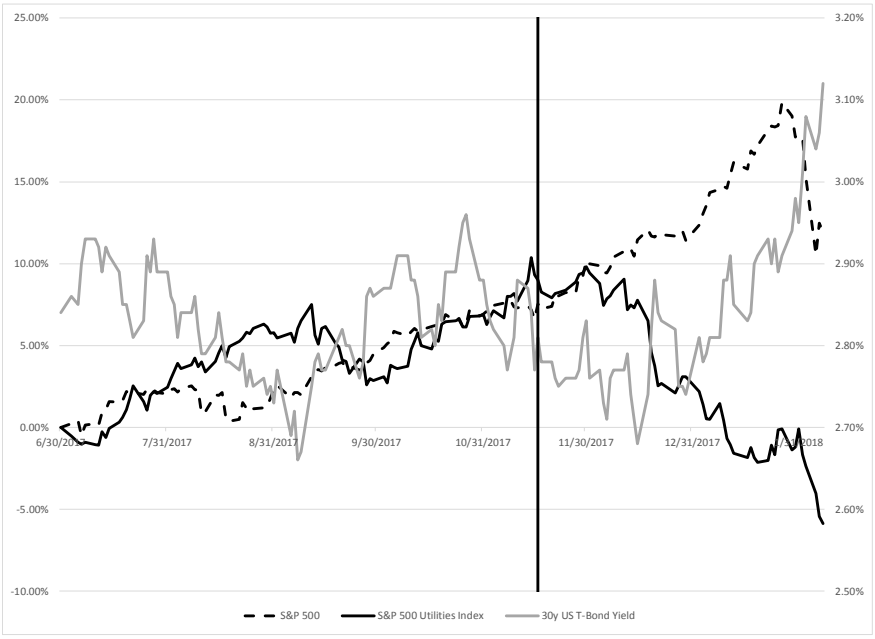
[4] Direct Testimony of Kevin W. O'Donnell, at 8.
[5] *Id.*, at 31.

and yields on 30-year Treasury bonds have increased from 2.81 percent to 3.11 percent on February 7, 2018, above the level when the initial GSMP case was approved in November 2015.

Chart 2: SPUX vs. S&P 500 vs. U.S. Treasury Bond Yield[6]



Q. Why is it reasonable to believe that long-term interest rates will continue to increase?

A. Investors expect the Federal Reserve to: (a) increase the Federal Funds rate three times in 2018, and (b) continue to reduce the size of its bond portfolio by no longer reinvesting the proceeds from current bond holdings. Additionally, the passage of the Tax and Jobs Act at the end of 2017 will require the federal government to issue more Treasury bonds to offset the decrease in revenue associated with the reduced tax rates, and the increased Federal budget that was recently approved will also require additional government borrowing. The Federal Reserve's current policy agenda, the tax reform legislation and the recently approved federal

[6] Source: SNL Financial.

budget will place upward pressure on long-term interest rates over the next few years. Therefore, ROE estimation models using current market data will likely under-estimate the cost of equity for Public Service during the period that the GSMP II will be in effect (i.e., 2019-2024).

Q. Do financial market participants expect the low interest rate environment to continue?

A. No, they do not. Several equity analysts have recently provided outlooks that suggest rising interest rates over the next year. Mohamed El-Erian, former CEO of PIMCO, notes that the yield on long-term government bonds remained relatively stable in 2017 even though short-term interest rates increased due primarily to the continued accommodative monetary policy of foreign central banks such as the Bank of Japan and the European Central Bank and increases in liability driven investment ("LDI")[7] flows as companies monetize the large profits they have gained on stock holdings and reinvest those earnings in long-term government bonds.[8] As a result, the demand for long-term government bonds from investors offset the impact of increases in short-term rates. As Mr. El-Erian explains, the factors that produced the relatively stable yield on long-term bonds government seen in 2017 are not expected to continue in 2018:

> [L]ooking ahead, there are four factors that will likely moderate the technical influences that have fueled this year's flattening [of the yield curve]:
> - A reduction in central banks' QE [large scale securities purchases by central banks] purchases, with the ECB [European Central Bank] already having committed to halving its monthly buys.
> - An increase in the supply to the market of government bonds, for reasons that include loosening of fiscal conditions in the U.S.

[7] LDI is an investment strategy where investments are selected based on the cash flows needed to fund future liabilities.
[8] El-Erian, Mohamed A., "Now Is Not the Time to Worry About the Yield Curve", Bloomberg.com, December 21, 2017.

- The currency-hedged yield available to foreign buyers has eroded and, in some cases, is now negative.
- A reduced pace of LDI activity.[9]

Q. Have equity analysts and investment advisors provided an outlook on interest rates?

A. Yes. Several equity analysts and investment advisors including J.P Morgan, Goldman Sachs, Charles Schwab, and Condor Capital Management have released outlooks setting the expectation for rising interest rates. For example, in a recent bulletin on the effect of tax reform on the U.S. economy and financial markets, J. P. Morgan Asset Management commented on the prospect for higher interest rates:

> In her last press conference as Fed Chair, Janet Yellen noted that most members of the FOMC had factored in the potential impact of tax reform in making their projections. However, their forecasts suggest that they may not have fully done so, and barring any negative shocks to the economy, it is likely unemployment will fall faster, and growth and inflation will rise faster, than the Fed expects in 2018.
>
> In this scenario, we expect the Fed to continue with balance sheet normalization along the path it has already laid out. It may be more aggressive in raising the Federal funds rate than it projects, although with new, perhaps cautious leadership from Jay Powell, this may only amount to four rate hikes rather than three, leaving the federal funds rate in the range of 2.25%-2.50% by the end of 2018. Still, with this rise in short rates, stronger than expected domestic growth and inflation, a booming overseas economy, a fast-rising federal budget deficit, tapering of central bank bond purchases overseas and growing bond sales from the Fed, it seems reasonable to expect that most of the increase in short rates will feed through to long-term rates, taking the 10-year Treasury yield from its current 2.40% to above 3.00% by the end of 2018.[10]

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[9] *Id.*

[10] J.P. Morgan Asset Management, "The investment implications of tax reform", December 20, 2017, at 6.

This view is further supported by the Investment Strategy Group at Goldman Sachs who noted that:

> Rates should also move higher at the long end of the curve, albeit to a lesser degree. Here, many of the forces that kept 10-year Treasury yields flat in 2017 are likely to abate, particularly the transitory drags from downward inflation surprises and year-end portfolio rebalancing flows following last year's strong equity gains. At the same time, continued gains in US employment should erode labor slack further; putting modest upward pressure on wage growth. Finally, yields at the long end of the curve are likely to get a lift from the many large central banks that have articulated plans to remove some monetary accommodation this year.[11]
>
> ****
>
> Overall, we expect 10-year rates to increase to 2.5-3.0% this year. Given today's scant coupon levels, even the modest increase in yields we expect would result in bonds underperforming cash (see Exhibit 116). As a result, we remain comfortable funding tactical tilts out of investment grade fixed income.[12]

Q. Please summarize the outlooks provided by other equity advisors.

A. In recent commentary discussing the 2018 market outlook for fixed income assets, Charles Schwab noted:

> 2018 could be the year that bond bears finally awaken from their long slumber, sending 10-year Treasury bond yields above the three-year high of 2.6%. Economic growth is picking up both globally and domestically and fiscal policy is becoming more expansive. Most importantly, the era of extremely easy money is coming to an end. The Federal Reserve is tightening monetary policy through rate hikes and balance sheet reduction. The European Central Bank (ECB) is planning to gradually reduce its bond buying program. Even the Bank of Japan (BOJ) is seeing some success with positive inflation while focusing on keeping 10-year bond yields at zero or above. As the easy-money era gradually recedes, we see more upside risk in yields than downside.[13]

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[11] Goldman Sachs Investment Management Division, "Outlook: (Un)Steady as She Goes", January 2018, at 83.
[12] *Id*.
[13] Jones, Kathy A., "2018 Market Outlook: Fixed Income", Charles Schwab, December 11, 2017.

Similarly, Condor Capital Management Group, in its discussion on the impact of the unwinding of the Federal Reserve's balance sheet, noted:

> Within the market for Treasuries, Federal Reserve economists have estimated that post-recession Treasury purchases have suppressed the yield on the 10-year by between 0.85% and 1%. With the 10-year's current yield of 2.37% (as of 12/4/17) practically unchanged since the Fed's September announcement, this implies that it could move almost a full percentage point higher over the long-run due to the Fed's unwinding. A recent analysis from Goldman Sachs puts this effect closer to 0.6%, though its timeline for the analysis is nearly four years shorter than the Fed's. Another important factor to note is the forward-looking nature of markets, meaning that this yield increase could potentially be priced into these securities before the balance sheet is fully unwound.[14]

In summary, the investment community expects long-term interest rates to increase over the course of 2018 and during the time that Public Service's GSMP II rates will be in effect. As of the preparation of this testimony, the 30-year Treasury bond yield is at 3.14 percent and the 10-year yield is at 2.88 percent.[15]

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

A. As discussed in Attachment AEB-GSMPII-1R, the Federal Reserve's accommodative monetary policy has caused investors to seek alternatives to the historically low interest rates available on Treasury bonds. Mr. O'Donnell agrees, stating: "Individuals seeking an income stream see utility dividends as good alternatives at present time with the lack of adequate fixed income (bond) opportunities. As a result, utility stock prices have soared in the past five years."16 As Mr. O'Donnell correctly notes, this search for higher yield has driven up the share

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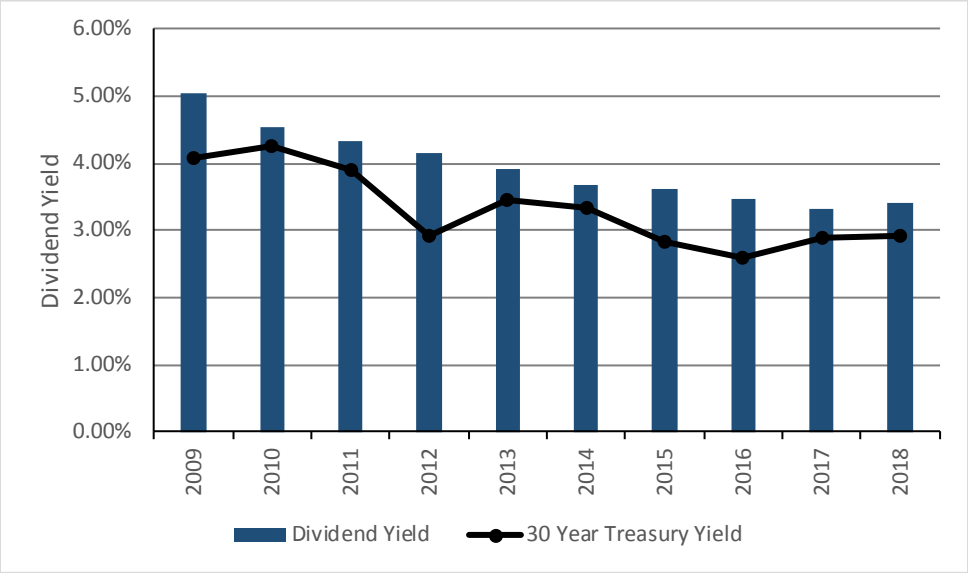
[14] Condor Capital Management, "What Will the Fed's Balance Sheet Reduction Mean for Markets?", December 6. 2017.
[15] February 12, 2018.
[16] Direct Testimony of Kevin W. O'Donnell, at 36.

prices for many common stocks, especially dividend-paying stocks such as utilities, while the dividend yields have decreased to levels well below the historical average. As shown in Chart 3, since the Federal Reserve intervened to stabilize financial markets and support the economic recovery after the Great Recession of 2008-09, Treasury bond yields and utility dividend yields have both declined. Specifically, Treasury bond yields have decreased by approximately 115 basis points since 2009, and utility dividend yields have decreased by approximately 163 basis points over this same period.

Chart 3: Dividend Yields for Utility Stocks



Q. How do equity investors view the utilities sector based on these market conditions?

A. Investment advisors have suggested that utility stocks may underperform as a result of market conditions. Charles Schawb recently provided guidance on the utilities sector.

> A growing U.S. economy could create a headwind for the utilities sector, the potential for rising inflation could lead to higher interest rates, reducing the attractiveness of dividend-paying utilities companies.
>
> Utilities stocks have been a bit more volatile than usual as their performance appears to be more tied to interest rates than it has been

> historically. Shares have rallied when bond yields have fallen and declined when yields have risen. We have warned against using equity dividends as a proxy for bond yield income as the risk characteristics are much different. We believe investors are slowly heeding that advice and rotating out of the utilities sector, contributing to its underperformance over the past year.
>
> We think U.S. economic data will continue to show improvement, prompting investors to move into more cyclical areas of the market, away from the traditionally defensive utilities sector. Although recent inflation readings have been relatively weak, we believe a tight labor market and improving economy could lead to rising inflation and higher rates than the market is currently expecting, potentially resulting in investors moving out of the "yield-chasing" trade that has helped to bolster the sector, much as we've seen over the past year during times of rising rates.[17]

Q. Have any regulatory commissions recognized that anomalous conditions in the capital markets have had an effect on the ROE estimation models?

A. Yes, several regulatory commissions have addressed the effect of capital market conditions on the DCF model. As discussed in Attachment AEB-GSMPII-1R, the Federal Energy Regulatory Commission ("FERC") has addressed this issue specifically as it relates to the DCF model. In addition, the Illinois Commerce Commission ("ICC"), the Pennsylvania Public Utility Commission ("PPUC") and the Massachusetts Department of Public Utilities ("MDPU") have all considered this factor in recent decisions.

Q. Please summarize the views of these commissions.

A. The PPUC, the ICC and the FERC have all recognized that the DCF model has been affected by recent market conditions. The MDPU recognized that low interest rates have affected the CAPM model results. In a 2012 decision for PPL Electric Utilities, while noting that the PPUC has traditionally relied primarily on the DCF method to estimate the cost of equity for

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[17] *Sorensen, Brad, "Utilities Sector Rating: Underperform", Charles Schwab, February 8, 2018.*

regulated utilities, the PPUC recognized that market conditions were causing the DCF model to produce results that were much lower than other models such as the CAPM and Bond Yield Plus Risk Premium. The PPUC's Order explained:

> Sole reliance on one methodology without checking the validity of the results of that methodology with other cost of equity analyses does not always lend itself to responsible ratemaking. We conclude that methodologies other than the DCF can be used as a check upon the reasonableness of the DCF derived equity return calculation.[18]

The PPUC ultimately concluded:

> As such, where evidence based on the CAPM and RP methods suggest that the DCF-only results may understate the utility's current cost of equity capital, we will give consideration to those other methods, to some degree, in determining the appropriate range of reasonableness for our equity return determination.[19]

In a recent ICC case, Docket No. 16-0093, Staff relied on a DCF analysis that resulted in average returns for their proxy groups of 7.24 percent to 7.51 percent. The Company (Illinois-American Water Company) demonstrated that those results were uncharacteristically too low, by comparing the results of Staff's models to recently authorized ROEs for regulated utilities and the return on the S&P 500.[20] The ICC agreed with the Company that Staff's proposed ROE of 8.04 percent was anomalous and recognized that a return that is not competitive will deter investment in Illinois.[21] In setting the return in that proceeding, the ICC recognized that it was necessary to consider other factors beyond the outputs of the financial models, particularly

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[18] Pennsylvania Public Utility Commission, PPL Electric Utilities, R-2012-2290597, meeting held December 5, 2012, at 80.
[19] *Id*., at 81.
[20] State of Illinois Commerce Commission, Docket No. 16-0093, Illinois-American Water Company Initial Brief, August 31, 2016, at 10.
[21] Illinois Staff's analysis and recommendation in that proceeding were based on its application of the multi-stage DCF model and the CAPM to a proxy group of water utilities.

whether the return is sufficient to attract capital, maintain financial integrity, and is commensurate with returns for companies of comparable risk, while balancing the interests of customers and shareholders.[22] Finally, in DPU 17-05, the MDPU noted that current Federal monetary policy has pushed Treasury yields to near historic lows. Therefore, the MDPU found that it is appropriate to use prospective interest rate expectations in the CAPM.[23]

> Current federal monetary policy that is intended to stimulate the economy has pushed treasury yields to near historic lows. Consequently, the Department has found that a CAPM analysis based on current treasury yields may tend to underestimate the risk-free rate over the long term and, thereby, understate the required ROE. The CAPM is based on investor expectations and, therefore, it is appropriate to use a prospective measure for the risk-free rate component. The Department has found that Blue Chip Financial Forecasts is widely relied on by investors and provides a useful proxy for investor expectations for the risk-free rate.[24]

Q. How has recent Tax Reform legislation affected regulated utilities?

A. The credit rating agencies have commented on the effect of the Tax Reform Act on regulated utilities. In summary, the Tax Reform Act is expected to reduce utility revenues due to the lower federal income taxes and the requirement to return excess accumulated deferred income taxes. This change in revenue is expected to reduce funds from operations ("FFO") metrics across the sector, and absent regulatory mitigation strategies, is expected to lead to weaker credit metrics and negative ratings actions for some utilities.[25]

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[22] State of Illinois Commerce Commission Decision, Docket No. 16-0093, Illinois-American Water Company, 2016 WL 7325212 (2016), at 55.

[23] D.P.U. 17-05, at 693.

[24] D.P.U. 17-05 Petition of NSTAR Electric Company and Western Massachusetts Electric Company, each doing business as Eversource Energy, Pursuant to G.L. c. 164, § 94 and 220 CMR 5.00 et seq., for Approval of General Increases in Base Distribution Rates for Electric Service and a Performance Based Ratemaking Mechanism, November 30, 2017, at 693.

[25] FitchRatings, Special Report, What Investors Want to Know, "Tax Reform Impact on the U.S. Utilities, Power & Gas Sector", January 24, 2018.

Moody's Investors Service ("Moody's) recently issued a report that changes the rating outlook for several regulated utilities from stable to negative. Moody's noted that the rating change affected companies with limited cushion in their ratings for deterioration in financial performance. The changes in tax laws result in the expectation that key credit metrics will remain lower for a longer period. Furthermore, Moody's expects that it will be necessary for utilities to work with regulators to try to mitigate the impact of tax reform.[26]

Q. Has the Board indicated how it will address changes in tax laws for utilities?

A. Yes. In its recent decision in BPU Docket No. AX180100001, the Board required the utilities that it regulates to establish new tariffs that reduce the collection of Federal income tax from 35 percent to 21 percent effective April 1, 2018, and to calculate the amount of deferred taxes that are over-collected as a result of tax reform with the expectation of establishing adjustments to rates by July 1, 2018.

Q, Will the Board's recent decision have implications for the utilities it regulates?

A. It is possible. Credit rating agencies are concerned with the effect of tax reform on credit metrics. While Moody's announced changes in credit outlooks for several utilities very quickly after the final tax reform was passed, FitchRatings ("Fitch") has indicated that any ratings actions will be guided by the response of regulators and the management of the utilities. Fitch notes that the solution will depend on the ability to manage the cash flow implications of the Tax Reform Act. Fitch noted that seeking a return of tax savings to customers immediately creates an immediate decline in cash flow. Fitch offers several solutions to provide rate stability and

[26] Moody's Investor Services, Global Credit Research, Rating Action: Moody's changes outlooks on 25 US regulated utilities primarily impacted by tax reform, January 19, 2018.

moderate changes to cash flow in the near term, including increasing the authorized ROE and/or equity ratio are measures that can be implemented.[27]

Q. What are your conclusions concerning the impact of capital market conditions on the cost of equity for Public Service's GSMP II?

A. My first conclusion is that the ROE estimation models have been affected by the anomalous market conditions that resulted from the Federal Reserve's extraordinary accommodative monetary policy since the end of the Great Recession. My second conclusion, which is equally important, is that the current anomalous market conditions are not expected to persist as the Federal Reserve continues to normalize monetary policy. As a result, current market conditions are not reflective of the market conditions that will be present when the GSMP II is in effect.

As discussed in Attachment AEB-GSMPII-1R, the FERC as well as state regulatory commissions in Illinois, Pennsylvania and Massachusetts have all considered this issue in recent decisions. In each case, the regulatory commission accounted for the changing capital market conditions by placing additional weight on models that include forward-looking inputs. The analysis I submitted for Public Service in the Company's January 2018 base rate case filing (Attachment AEB-GSMPII-1R) likewise considered alternative models with forward-looking inputs such as the projected DCF model and the CAPM using forward-looking Treasury yields and a forward-looking market risk premium instead of ignoring the indicators of impending market condition changes. Therefore, my recommended ROE for Public Service in that

[27] FitchRatings, Special Report, What Investors Want to Know, "Tax Reform Impact on the U.S. Utilities, Power & Gas Sector", January 24, 2018.

proceeding takes into consideration the likelihood that capital costs will continue to increase in the near to intermediate term.

Finally, without adequate regulatory support, tax reform will have a negative effect on utility cash flows, which increases investor risk expectations for utilities. The recent decline in utility stock prices since the initial legislation passed demonstrates investors' perception of the increased risk in utility stocks. These factors support the ROE that has been requested in the Company's base rate filing and demonstrate that the ROE proffered in the GSMP II filing is conservative in the current environment.

V. ROE ESTIMATION METHODOLOGIES

A. Proxy Group Selection

Q. Please summarize the proxy groups that Mr. O'Donnell relied on in his analysis.

A. Mr. O'Donnell has developed two proxy groups to estimate the appropriate ROE for Public Service. His first proxy group consists of combination electric and gas distribution companies. His second proxy group is comprised of gas distribution companies. In addition, Mr. O'Donnell develops an ROE estimate for PSEG, the parent holding company for Public Service.

Q. Do you agree with Mr. O'Donnell's proxy group selection?

A. No, I do not. While I recognize that this proceeding involves a gas infrastructure modernization program, I disagree with the use of a natural gas distribution company proxy group. Public Service operates as a combination electric and gas utility and is viewed by investors as a combination company. The Company raises capital as a combination company,

and does not issue separate debt or equity for its electric and gas operations. In addition, the business and financial risks of Public Service are comparable to those of a combination electric and gas utility. Therefore, I believe it is most appropriate to rely on a combination electric and gas utility proxy group, as opposed to a gas only proxy group. Furthermore, as Mr. O'Donnell recognizes, the natural gas proxy group is a relatively small sample size, particularly as compared to the combination electric and natural gas companies. Therefore, since the combination electric and natural gas companies are risk comparable, and since there is a sufficient sample size to rely on, it is more appropriate to rely on this group. Further, Mr. ODonnell notes that the gas-only utility group has been heavily engaged in M&A activity over the past several years. This has also contributed to elevated stock prices among that group as investors expect continued M&A activity and associated premiums. As a result, this further skews the ROE results of gas-only distribution utilities.

Q. Do you agree with the screening criteria that Mr. O'Donnell relied on to develop his electric utility proxy group for Public Service?

A. No, I do not. While Mr. O'Donnell suggests that he has established screening criteria to include companies that are similar in risk to Public Service, his screening criteria fail to meet that objective. Mr. O'Donnell begins with the Value Line universe for electric and gas operations and applies two criteria: 1) S&P's Global Market Intelligence Quality Ranking, which measures growth and stability of earnings and dividends, 2) exclusion of the companies that could be involved in a merger. The resulting group includes a wide range of companies, many of which are not comparable to Public Service.

Q. How did you establish the proxy group companies that you relied on in the Company's base case filing?

A. As discussed in Attachment AEB-GSMPII-1R, I began with an understanding of the Company. Public Service is a wholly-owned subsidiary of PSEG that provides electric transmission and distribution services to approximately 2.2 million retail customers and gas distribution service to approximately 1.8 million retail customers in New Jersey, including the six largest cities.[28] Public Service accounted for approximately 68 percent of PSEG's net income on average over the period from 2014-2016.[29] Public Service's current long-term issuer ratings are: (1) S&P BBB+ (Outlook: Stable); and (2) Moody's Investor's Service Baa1 (Outlook: Stable).[30]

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

- Are covered by at least two utility industry analysts;
- Have positive long-term earnings growth forecasts from at least two sources;
- Pay quarterly cash dividends that have not been reduced in the last three years, since companies that do not pay dividends cannot be analyzed using the DCF model;
- Have investment grade long-term issuer ratings from S&P and/or Moody's;
- Derive more than 70 percent of total operating income from regulated utility operations;
- Derive more than 50 percent of regulated operating income from electric utility operations;

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[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.

- Derive more than 10 percent of regulated operating income from gas distribution operations, or have dedicated more than 10 percent of assets to regulated gas distribution operations;
- Are not engaged in mergers or other transformative transactions during the analytical period; and
- Are not engaged in significant nuclear construction projects due to the risk of cost overruns and delays and the uncertainty created by the bankruptcy filing of Westinghouse.

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

Q. Have you determined whether or not Mr. O'Donnell's proxy group meets these criteria?

A. Yes. Schedule AEB-GSMPII-2R summarizes the screening criteria that I relied on to develop my proxy group and identifies whether Mr. O'Donnell's proxy companies meet those criteria. As shown in that exhibit, eleven of Mr. O'Donnell's proxy companies are not comparable to Public Service based on those screening criteria. The majority of the companies in Mr. O'Donnell's combination gas and electric proxy group have very little regulated natural gas operations (Alliant, Duke Energy, Entergy, Exelon, Fortis, PPL Corp and Southern Company). Both Entergy and PPL did not have positive EPS growth rates. Avista is currently involved in a merger, and Southern Company has significant nuclear development risk.

Q. Do you agree with Mr. O'Donnell's use of PSEG in his ROE analysis?

A. No, I do not. In order to avoid the circular logic that otherwise would occur, it is my general practice to exclude the subject company, or its parent holding company, from the proxy group.

B. Constant Growth DCF Analysis

Q. Please summarize Mr. O'Donnell's Constant Growth DCF analysis.

A. Mr. O'Donnell performs a Constant Growth DCF analysis on his combination electric and gas utility proxy group, his gas distribution proxy group, and PSEG (the parent holding company for Public Service). While Mr. O'Donnell summarizes many forms of growth rates he does not specifically rely on any of those growth rates to develop his DCF analysis. Instead of applying any of the company-specific growth rate estimates, Mr. O'Donnell selects his own estimates of 4.0 percent to 6.0 percent for the combination proxy group, 4.25 percent to 6.25 percent for the gas distribution proxy group, and 3.0 percent to 5.0 percent for PSEG. Mr. O'Donnell applies these growth rates to the 13-week average dividend yield for the proxy group which produces a range of ROE estimates of 7.40 percent to 9.50 percent for the combination proxy group, 6.85 percent to 9.05 percent for the gas distribution proxy group, and 6.40 percent to 8.60 percent for PSEG.

Q. Please comment on the results of Mr. O'Donnell's Constant Growth DCF analysis.

A. The low end of Mr. O'Donnell's Constant Growth DCF results are well below the authorized returns for electric and gas utility companies in other jurisdictions, while the high end of his results is at the low end of the range of recently authorized returns. Furthermore, his ROE recommendation of 9.0 percent which is based on the upper end of his Constant Growth DCF

results, is at the bottom of the authorized returns for combination electric utilities. Rather than questioning why the DCF model is producing results that are so far outside the range of comparable returns for other regulated utilities, Mr. O'Donnell justifies his reliance on the DCF model as it is "used more often than any other method",[31] and "intuitively a very simple model to understand."[32] While I agree that the DCF model is commonly used in regulatory proceedings and is simple to understand, that does not change the fact the DCF model is not producing reasonable results under current market conditions. For this reason, it is important to consider the results of multiple methods because each ROE estimation model has its strengths and limitations.

Q. Do you agree with Mr. O'Donnell's application of the DCF model?

A. No, I do not. Mr. O'Donnell's analysis is not based on the market's view of the growth of the proxy companies, nor is it based on the specific growth rates for the companies that are included in his proxy group. Rather, his analysis relies on a 13- week average dividend yield for the proxy companies and his estimate of the average growth for the proxy group. Mr. O'Donnell's chosen growth rates do not reflect the market view of the expected growth for his proxy companies.

Q. Please summarize Mr. O'Donnell's testimony regarding the appropriate growth rate in the DCF model.

A. According to Mr. O'Donnell, since the DCF model is dependent on future dividend growth, it would be inappropriate to use only earnings growth rates in the DCF model. Doing so

[31] Direct Testimony of Kevin W. O'Donnell, at 18.
[32] *Id*., at 20.

produces unrealistically high return on equity numbers that cannot be sustained in real life.[33] Mr. O'Donnell considers both historic and projected earnings, dividend and book value growth rates, as well as sustainable growth.

Q. Do you agree with Mr. O'Donnell regarding the appropriate growth rates to be relied on in the DCF model?

A. No, I do not. First, it is important to recognize that Mr. O'Donnell does not specifically rely on any of the growth rates for his proxy companies. Rather he chooses two growth rates: 4.0 percent and 6.0 percent and applies those in the Constant Growth DCF model. However, as discussed in my Direct Testimony in the base rate case, which is included as Attachment AEB-GSMPII-1R in this proceeding, earnings per share growth rates are the appropriate growth rates to rely on in the Constant Growth DCF model. To reduce the long-term growth rate to a single measure, one must assume that the dividend payout ratio remains constant and that earnings per share, dividends per share, and book value per share all grow at the same constant rate. Over the long run, dividend growth can only be sustained by earnings growth. Earnings growth rates tend to be least influenced by capital allocation decisions that companies may make in response to near-term changes in the business environment. Since such decisions may directly affect near-term dividend payout ratios, estimates of earnings growth are more indicative of long-term investor expectations than are dividend or book value growth estimates. Furthermore, earnings per share growth rates are the more prevalent growth rate estimates. Firms such as Thomson Reuters and Zacks Investment Research compile and publish consensus earnings growth rate

[33] *Id*., at 25.

estimates, the majority of which are based on several contributing analysts. Considering Mr. O'Donnell's testimony and my Direct Testimony in the base rate proceeding, there are five sources of earnings per share estimates available to review and consider. In contrast, dividend and book value per share and the sustainable growth rate are all derived from Value line reports. These reports are published by a single analyst and therefore are not as robust as the market consensus estimates of earnings per share growth.

Q. Do you agree with Mr. O'Donnell that the sustainable growth rate should be used in the DCF model?

A. In general, I do not agree with the use of sustainable growth rates in the Constant Growth DCF model. Academic research has shown that there is not a positive correlation between retention growth rates and future earnings growth. In 2006, for example, two articles appeared in Financial Analysts Journal, which addressed the theory that high dividend payouts (*i.e.*, low retention ratios) are associated with low future earnings growth.[34] Both of those articles cite a 2003 study by Arnott and Asness[35] who found that, over the course of 130 years of data, future earnings growth is associated with high, rather than low payout ratios.[36]

In addition, I do not agree with how Mr. O'Donnell has calculated his sustainable growth rates. However, since Mr. O'Donnell has not presented Constant Growth DCF results based solely on sustainable growth rates, I have not corrected his calculation.

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[34] Ping Zhou, William Ruland, *Dividend Payout and Future Earnings Growth*, Financial Analysts Journal, Vol. 62, No. 3, 2006. *See* also Owain ap Gwilym, James Seaton, Karina Suddason, Stephen Thomas, *International Evidence on the Payout Ratio, Earnings, Dividends and Returns*, Financial Analysts Journal, Vol. 62, No. 1, 2006.

[35] Robert Arnott, Clifford Asness, *Surprise: Higher Dividends = Higher Earnings Growth*, Financial Analysts Journal, Vol. 59, No. 1, January/February 2003.

[36] Since the payout ratio is the inverse of the retention ratio, the authors found that future earnings growth is negatively related to the retention ratio.

From a theoretical perspective, Mr. O'Donnell's calculation of sustainable growth rates considers only the product of earnings retention rates and earned returns on common equity, or what are commonly known as internally-generated funds. In the sustainable growth formula, this is commonly referred to as the product of "b*r", where "b" is the retention ratio or the portion of net income not paid in dividends, and "r" is the expected ROE on the portion of net income that is retained within the Company as a means for future growth. Mr. O'Donnell fails to consider that earnings growth also occurs as a result of new equity issuances, or what are commonly known as externally-generated funds. In the sustainable growth formula, this is shown as the product of "s*v", where "s" represents the growth in shares outstanding and "v" is that portion of the M/B ratio that exceeds unity. This methodology is recognized as a common approach to calculating the sustainable growth rate.[37]

Q. Have other regulatory commissions abandoned the use of sustainable growth rates in its electric transmission ROE methodology?

A. Yes. In Opinion No. 531, the FERC changed its approach on the DCF methodology to be applied in public utility rate cases.[38] In summary, the FERC adopted the same two-step DCF methodology it has employed in gas and oil pipeline rate proceedings since the mid-1990s, in place of the one-step methodology previously used. The FERC's two-stage DCF approach does not rely on a sustainable growth calculation.

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[37] *See* Roger Morin, New Regulatory Finance, at 306.
[38] Opinion No. 531 147 FERC ¶ 61,234 (June 19, 2014).

Q. Would the results of Mr. O'Donnell's DCF analysis change if he had relied on a risk-comparable proxy group and projected earnings per share growth rates?

A. Yes, as noted previously, the majority of Mr. O'Donnell's proxy companies would not have met the screening criteria that I relied on in my Direct Testimony. As shown in Schedule AEB-GSMPII-3R, using the 13-week dividend yield ending January 31, 2018 and relying on the earnings per share growth rates summarized in Schedule KWO-1, the DCF results for a risk-comparable proxy group would be 8.2 percent, which is lower than any return that has been authorized by any commission over the past two years. Considering only the companies in Mr. O'Donnell's proxy group that are risk comparable, based on my screening criteria, the mean return increases to 9.60 percent. This return falls at the low end of the range of recently authorized ROEs presented in Chart 1.

Q. Do you believe it is appropriate to rely solely on the Constant Growth DCF in setting the ROE in this proceeding?

A. No, I do not. As discussed previously in my Rebuttal Testimony and in my Direct Testimony in the base rate proceeding (Attachment AEB-GSMPII-1R), recent market conditions have affected the dividend yields in the DCF model such that the results of this model understate the cost of equity at this time. Therefore, while I consider the results of the DCF model, my recommended ROE in the base rate proceeding also considers the results of risk premium methodologies, such as the CAPM and the Bond Yield Risk Premium approach. This is generally consistent with the changes that the FERC has made to its approach for setting the ROE in recent electric transmission proceedings. In addition, the results of the projected DCF analysis that was provided as part of my Direct Testimony in the base rate proceeding reflect the higher cost of equity that investors will require as interest rates return to more normal levels.

C. Comparable Earnings

Q. Please summarize Mr. O'Donnell's Comparable Earnings analyses.

A. Mr. O'Donnell presents two Comparable Earnings analyses.[39] The first is based on the earned returns on common equity for the companies in his combination proxy group and gas distribution proxy group, as well as PSEG, over the period of 2015-2022. This analysis produces a range from 9.30 percent to 12.90 percent. The second analysis is based on authorized ROEs for gas distribution companies across the U.S. from 2007-2016. Chart 3 in Mr. O'Donnell's Direct Testimony shows the general decline in authorized returns since 2001, as well as the increase that occurred from 2016 to 2017. Mr. O'Donnell concludes that his Comparable Earnings analyses produce a range of returns from 9.00 percent to 11.00 percent.

Q. Do you have any comments on these analyses?

A. Mr. O'Donnell's first Comparable Earnings analysis demonstrates that the earned return on common equity for the proxy group of combination electric and gas utilities is within a range from 10.10 percent to 11.00 percent. This analysis fully supports the testimony I submitted in Attachment AEB-GSMPII-1R and demonstrates that the 9.75 percent return that Public Service has relied on in the GSMP II case is conservative.

Mr. O'Donnell's analysis of returns in other jurisdictions is focused entirely on gas distribution companies. However, Public Service is a combination electric and gas utility. Therefore, it would be more appropriate to consider the authorized ROEs for the companies in his combination electric and gas proxy group as a benchmark for Public Service. Doing so

[39] *Id*., at 26-29.

would produce a range of authorized returns that overlaps the range presented in my testimony in Attachment AEB-GSMPII-1R. Furthermore, Mr. O'Donnell's analysis includes nine settlement agreements that were approved by the New York Public Service Commission ("NYPSC") in 2016-2017, all of which included low authorized ROEs as part of multi-year rate settlements. The NYPSC cases represent seven percent of the total authorized returns relied on in Mr. O'Donnell's Comparable Earnings analysis over the 2016-2017 period. The large number of settlement agreements consolidated in one regulatory jurisdiction has the effect of reducing the average return for Mr. O'Donnell's national ROE review. As shown in Chart 1, when one excludes these NYPSC settlements, the majority of authorized returns in other jurisdictions are between 9.50 percent and 10.50 percent, which is 50 to 150 basis points higher than the Rate Counsel's recommendation of 9.00 percent.

Lastly, it is unclear how Mr. O'Donnell establishes the low end of his range in his Comparable earnings approach of 9.00 percent since none of Mr. O'Donnell's Comparable Earnings approaches produce results that range. It may be that Mr. O'Donnell is relying on the recently authorized settlements in New York for this lower bound. It is important to recognize that these returns are associated with settlement decisions in one regulatory jurisdiction and may therefore be more an indication of the parties' willingness to compromise, rather than a signal of the appropriate ROE requirements for combination utilities across the U.S.

D. CAPM Analysis

Q. Please summarize Mr. O'Donnell's CAPM analysis.

A. Mr. O'Donnell expresses reservations about the CAPM, especially when it is applied using a forecasted market risk premium or forecasted interest rates. However, he recognizes that

the FERC has recently considered the results of alternative risk-premium based methodologies such as the CAPM. For that reason, Mr. O'Donnell has performed a CAPM analysis to supplement his DCF analysis, but he indicates that he has not given the CAPM analysis much weight.[40]

Mr. O'Donnell develops his CAPM analysis using current yields on 30-year Treasury bonds as the risk-free rate, beta coefficients reported by Value Line, and a market risk premium of 4.0 percent to 6.0 percent based on historical returns and a handful of market return estimates that were published in January 2016. Based on these inputs and assumptions, Mr. O'Donnell's CAPM analysis produces a return estimate in the range of 5.5 percent to 7.5 percent.

Q. Please comment on the results of Mr. O'Donnell's CAPM analysis.

A. Mr. O'Donnell's CAPM results of 5.50 percent and 7.50 percent are entirely inconsistent with the returns required by equity investors for companies with commensurate risk. To place these results in context, they are 225 to 425 basis points below the currently authorized ROE of 9.75 percent for Public Service's GSMP. Furthermore, neither of Mr. O'Donnell's CAPM results has ever been observed as an authorized ROE for any electric or gas utility in at least the past 35 years.[41]

Q. What are your concerns with the inputs and assumptions that Mr. O'Donnell has used to develop his CAPM estimate?

A. I disagree with two aspects of Mr. O'Donnell's CAPM analysis: 1) the use of a current Treasury bond yield as the risk-free rate; and 2) the use of an under-stated market risk premium

[40] Direct Testimony of Kevin W. O'Donnell, at 29.
[41] Source: Regulatory Research Associates.

that is, in part, based on historical returns and which does not reflect the inverse relationship between interest rates and the equity risk premium.

Q. How does Mr. O'Donnell justify his use of the current Treasury bond yield as the risk-free rate in his CAPM analysis?

A. Mr. O'Donnell testifies that he used the current Treasury bond yield as the risk-free rate in the CAPM analysis because economic forecasters and the Federal Reserve believe the current interest rate environment is expected to remain relatively stable for many years to come.[42] He cites a June 2016 quote from outgoing Fed Chair Yellen as support for his view that interest rates are expected to remain relatively stable for many years to come.

Q. What is your response?

A. As explained in Section III of my Rebuttal Testimony, capital markets have experienced a prolonged period of low interest rates as central banks in the U.S. and around the world have taken extraordinary steps to stimulate the economy after the financial crisis and Great Recession. Utility regulators in other jurisdictions are struggling with how to interpret the results of financial models that are being impacted by what the FERC has characterized as "anomalous" capital market conditions. As noted previously, the Massachusetts DPU recently issued a decision supporting the use of projected Treasury bond yields in the CAPM analysis as one way to adjust the inputs to the models during this period of low interest rates.[43] Such an adjustment is justified

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[42] Direct Testimony of Kevin W. O'Donnell, at 31.

[43] D.P.U. 17-05 Petition of NSTAR Electric Company and Western Massachusetts Electric Company, each doing business as Eversource Energy, Pursuant to G.L. c. 164, § 94 and 220 CMR 5.00 et seq., for Approval of General Increases in Base Distribution Rates for Electric Service and a Performance Based Ratemaking Mechanism, November 30, 2017, at 693.

given the market's expectation that long-term interest rates will increase from current levels over the period during which GSMP II rates will remain in effect.

Q. Can you provide an example of another time when the use of current interest rates would not have been appropriate?

A. Yes. Following Mr. O'Donnell's logic that current interest rates will remain relatively stable, the Board would have based ROE determinations in the early 1980s on government bond yields of 15-18 percent, even though those interest rates had started a long, steady decline. As a result, ratepayers would have been paying unnecessarily high capital costs. Today, the situation is reversed. Interest rates are near historic lows, but have been increasing as the Federal Reserve continues tightening monetary policy and unwinding the asset purchases made after the Great Recession, and as the effects of tax reform and increased government debt flow through to long-term Treasury yields. Setting the cost of equity for Public Service's GSMP II based on the assumption that current interest rates will continue in perpetuity is very likely to under-compensate investors as capital costs increase.

Q. Please explain your disagreement with Mr. O'Donnell's use of a market risk premium in the CAPM analysis based on historical returns.

A. Given the current low yields on Treasury bonds, and the inverse relationship between interest rates and the market risk premium, my concern is that Mr. O'Donnell's market risk premium estimate based on historical returns of 4.60 percent to 6.20 percent is understated. As shown in Table 3 of Mr. O'Donnell's testimony, the average historical return on long-term government bonds is 5.50 percent (geometric mean) and 5.90 percent (arithmetic mean), while the 30-day average yield on long-term government bonds at the time that he filed his testimony

was approximately 2.80 percent.[44] The historical market risk premium as reported by Duff and Phelps is 7.0 percent through 2016.[45] Because interest rates on long-term government bonds are well below the historical average of 5.50 percent or 5.90 percent, the inverse relationship between interest rates and the marker risk premium implies that the forward-looking market risk premium should be higher than the historical average of 7.0 percent.

Q. Is there evidence that the use of a historical market risk premium may produce counter-intuitive results?

A. Yes. Relying on the historical market risk premium may produce results that are not consistent with investor sentiment and current conditions in capital markets. For example, Morningstar has observed:

> It is important to note that the expected equity risk premium, as it is used in discount rates and the cost of capital analysis, is a forward-looking concept. That is, the equity risk premium that is used in the discount rate should be reflective of what investors think the risk premium will be going forward.[46]

In addition, Duff & Phelps specifically addresses the risk of relying on the historical market risk premium that includes the negative market returns that were the result of the financial market collapse in 2008.[47]

> If one simply added an estimate of the ERP taken from commonly used sources before the Financial Crisis to the spot yield on 20-year U.S. government bonds at month-end December 2008, one would have arrived at an estimate of the cost of equity capital that was too low.

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[44] Source: Bloomberg Professional.
[45] Based on income only returns on government bonds, which is what Duff and Phelps recommends.
[46] Morningstar Inc., 2010 Ibbotson Stocks, Bonds, Bills, and Inflation, Valuation Yearbook, at 55.
[47] Duff & Phelps acquired and maintains the Ibbotson historical return data referenced in the Ibbotson Stocks, Bonds Bills and Inflation Valuation Handbook.

> For example, as illustrated in Exhibit 3.11, at December 2007 the yield on the 20-year U.S. government bonds equaled 4.5%, and the realized risk premium reported based on the average realized risk premiums for 1926-2007 was 7.1%. But at December 2008, the yield on 20-year U.S. government bonds was 3.0%, and the realized risk premium reported based on the average realized risk premiums for 1926-2008 was 6.5%.
>
> So just at the time that the risk in the economy increased to arguably the highest point, the base cost of equity capital using realized risk premiums decreased from 11.6% (4.5% plus 7.1%) to 9.5% (3.0% plus 6.5%). [48]

The assumption that investors would expect or require a lower risk premium during periods of increased volatility is counter-intuitive and leads to unreliable analytical results. The relevant issue in the application of the CAPM is to ensure that all three components of the model (i.e., the risk-free rate, Beta, and the market risk premium) are consistent with market conditions and investor perceptions. Assuming a lower market risk premium during periods of increased risk aversion is at odds with that premise.

Q. Is there support for the use of a forward-looking market risk premium in the CAPM analysis?

A. Yes. The Federal Regulatory Energy Commission ("FERC") has stated:

> A CAPM analysis is backward-looking if its market risk premium component is determined based on historical, realized returns. A CAPM analysis is forward-looking if its market risk premium component is based on a DCF study of a large segment of the market. In a forward-looking CAPM analysis, the market risk premium is calculated by subtracting the risk-free rate from the result produced by the DCF study.[49]

The New York PSC also relies on a forward-looking market risk premium that is based on projected returns for the broad market less the Treasury bond yield. As such, I conclude that

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[48] Duff & Phelps, 2017 Valuation Handbook, U.S. Guide to Cost of Capital, at 3-37; 3-38.

[49] 150 FERC ¶ 61,165, Docket Nos. EL11-66-002, Opinion No. 531-B, para. 108.

the method I used in Attachment AEB-GSMPII-1R to calculate the market return and the projected market risk premium is more appropriate and aligned with investors' expectations of future market conditions than is Mr. O'Donnell's use of a historical market risk premium.

Q. Please comment on Mr. O'Donnell's market risk premium estimate based on a January 2016 Morningstar article in which a few investors provide return expectations for the U.S. equity markets over the next decade.

A. I disagree with the calculation that Mr. O'Donnell relies on to estimate the market risk premium. The Morningstar article cited by Mr. O'Donnell was published more than two years ago, and is based on the outlooks of the reporting analysts for the time period from April 2015 to January 2016. Therefore, these views are not representative of the "forward-looking" market risk premium to be used in 2018. Furthermore, the relatively small sample; only six analysts that were quoted in the article is not a reasonable representation of the market's view of expected returns. Finally, it is not appropriate to calculate a forward-looking market risk premium in 2018 by relying on the expected return on the market in 2015 less the average yield on 30-year Treasury bonds in 2017.

Q. What is the appropriate methodology that should be used to calculate the market risk premium?

A. The forward-looking market premium is calculated by subtracting a measure of the projected risk-free rate from a projected return on the overall market. This methodology has also been endorsed by the FERC, which stated:

> In this proceeding, the NETOs submitted a forward-looking CAPM study, using 30-year Treasury bonds for the risk-free rate, betas published by Value Line, and a market risk premium based on a DCF study of all S&P 500 companies that were paying dividends. The NETOs' CAPM approach

is a generally accepted methodology routinely relied upon by investors and, therefore, one appropriately used to corroborate our own analysis.[50]

Q. Have you estimated the projected market risk premium?

A. Yes. As shown in Attachment AEB-GSMPII-1R, I relied on an approach that is consistent with the methodology that the FERC recently approved. I estimated the expected return on the market by applying the Constant Growth DCF to the S&P 500 companies using the expected earnings growth rates for those companies as reported by Bloomberg. For a low-end market risk premium, I deducted the long-term projected yield on the 30-year Treasury bond to estimate the market risk premium. For a high-end market risk premium, I deducted the then-current 180-day average risk-free rate. The result of that analysis is a market risk premium of 9.75 percent to 11.01 percent.

Q. Is there additional support for the reasonableness of the market return you have used to calculate the forward-looking market risk premium?

A. Yes, other alternative sources provide reputable forecasts of market returns that are significantly higher than the historical and projected returns relied on by Mr. O'Donnell. In Table 1, I provide the S&P 500 return as reported by Bank of America/Merrill Lynch and additional estimations of the S&P 500 return calculated using earnings growth projections from Bloomberg Professional, Yahoo!Finance, and Standards and Poor's. The calculated returns for the S&P 500 range from 10.61 percent (Bloomberg Professional) to 15.16 percent (Standard and Poor's). Therefore, the total return for the S&P 500 Index that I used to determine the forward-looking market risk premium in my CAPM analysis is well supported by the range of returns

[50] *Id*., at 109.

shown in Table 1. By contrast, Mr. O'Donnell's estimated market returns and resulting risk premiums are well outside this range and do not represent investor expectations under current market conditions.

Table 1: S&P 500 Return Estimates[51]

Source	Estimate Date	Dividend Yield	Growth Estimate	S&P 500 Return
Bloomberg Professional	January 25, 2018	1.75%	8.79%	10.61%
Bank of America – Merrill Lynch[52]	October 11, 2017	N/A	N/A	11.00%
Yahoo!Finance	January 25, 2018	1.75%	12.00%	13.86%
Standard and Poor's	January 18, 2018	1.75%	13.29%	15.16%

Q. How would the use of your market risk premium change the results of Mr. O'Donnell's CAPM analysis?

A. As shown in Schedule AEB-GSMPII-4R, updating Mr. O'Donnell's CAPM analysis to rely on the market risk premium used in the analyses that I relied on in the base rate filing produces returns for the combination utility proxy group of 10.39 percent to 10.48 percent.

Q. What is your conclusion regarding Mr. O'Donnell's CAPM analysis?

A. My conclusion is that Mr. O'Donnell's CAPM analysis is based on flawed assumptions and inputs which are not forward-looking. As such, the results of his CAPM analysis are well below any authorized return for a gas or electric utility over the past 35 years and cannot be relied upon to estimate the cost of equity for Public Service's GSMP II.

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[51] Bloomberg and Yahoo!Finance do not report a dividend yield for the S&P 500; therefore, the 2017 average dividend yield reported in the January 18, 2018, S&P 500 Earnings and Estimate Report was used to calculate the total return.

[52] Required Return - Bank of America Merrill Lynch, Quantitative Profiles, October 11, 2017, at 58.

E. Capital Structure

Q. Please summarize Mr. O'Donnell's capital structure recommendation.

A. Mr. O'Donnell recommends a capital structure consisting of 50.0 percent common equity, 49.3848 percent long-term debt, and 0.6152 percent customer deposits. By comparison, the Company is requesting an equity ratio for purposes of the GSMP II of 51.2 percent, as shown in the Direct Testimony of Company witness Mr. Stephen Swetz. Mr. O'Donnell contends that since the GSMP II is a cost recovery mechanism that limits the risk of Public Service, the corresponding lower financial risk should be reflected in a lower common equity ratio.[53]

Q. Please comment on the analysis that Mr. O'Donnell provides to support his capital structure recommendation.

A. Mr. O'Donnell's capital structure analysis is summarized in Table 8 of his Direct Testimony. As shown in this Table, the average common equity ratio for combination electric and gas utilities is 43.8 percent, for gas distribution companies in 51.9 percent, and for PSEG is 54.7 percent. These figures appear to be at the holding company level, rather than the operating utility level. In addition, Mr. O'Donnell observes that the average authorized equity ratio for electric and natural gas utilities in 2017 was 49.1 percent.

In Attachment AEB-GSMPII-1R, I provided an analysis of the capital structures at the operating company level for the operating utility companies held by my proxy group of combination electric and gas utilities. As shown in that analysis, in the third quarter of 2017, the weighted average equity ratio for the proxy group is approximately 51.7 percent, and the high

[53] Direct Testimony of Kevin W. O'Donnell, at 46.

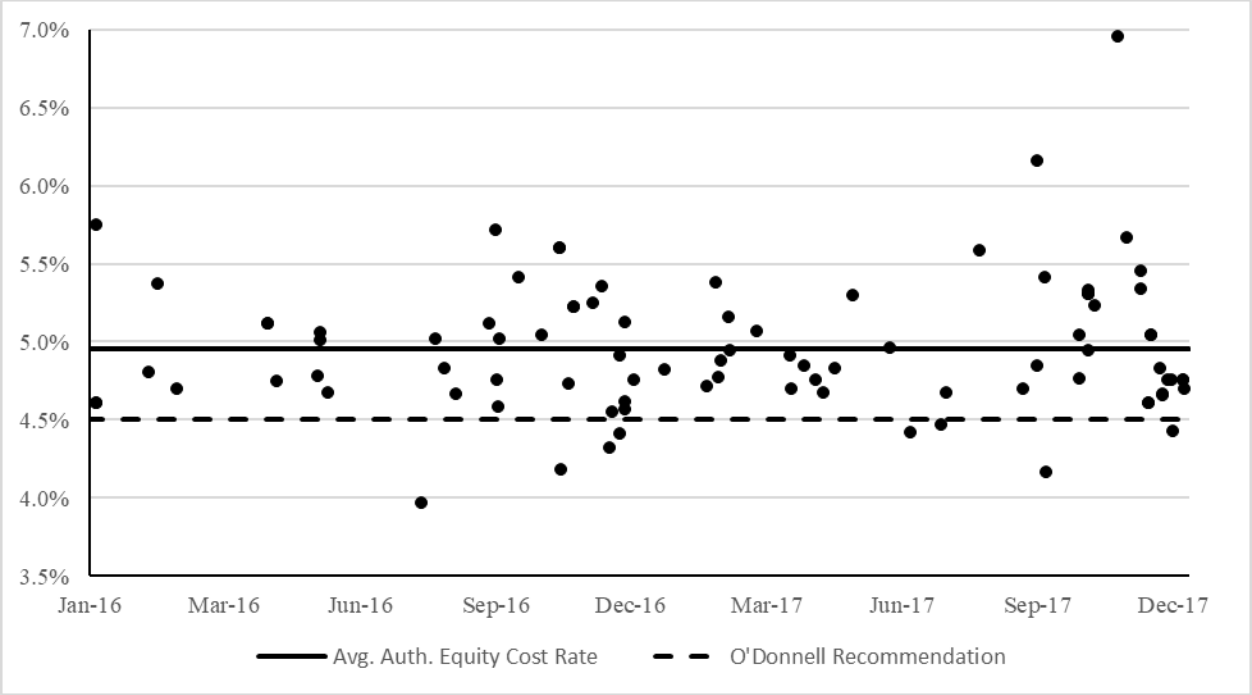
end of the range is 55.7 percent. Based on that analysis, Public Service's requested common equity ratio for purposes of the GSMP II of 51.2 percent is slightly lower than the average equity ratio for the proxy group. Mr. O'Donnell's analysis at the holding company level is not a relevant point of comparison to the authorized equity ratio for Public Service. As shown in Schedule AEB-GSMPII-5R, which updated Mr. O'Donnell's analysis for the operating company capital structures, the average common equity ratio for his proxy group in the third quarter of 2017 was 52.10 percent and the high end of the range is 60.49 percent. Based on these analyses I conclude that the equity ratio that Public Service relied on in this proceeding is conservative and the requested equity ratio in the base case proceeding is reasonable and should be approved.

In response to Mr. O'Donnell's assertion that the GSMP II limits the risk of Public Service and therefore supports a lower equity ratio, as shown in Schedule 8 of Exhibit AEB-1R, 70 percent of the operating companies in my proxy group have capital tracking mechanisms that are similar to the GSMP II. Therefore, any risk reducing elements of cost recovery mechanisms such as the GSMP II are already reflected in the capital structures of the proxy group, and no adjustment is needed to the capital structure (or the authorized ROE) for Public Service.

Q. How do Mr. O'Donnell's proposed return on equity and equity ratio compare with the recently authorized ROEs and capital structures for the electric and natural gas utilities in other jurisdictions?

A. The equity cost rate, which is the product of the equity ratio and the return on equity, is the return to shareholders. Chart 4 calculates the equity cost rates that result from recently authorized ROEs and equity ratios in 2016-2017. Chart 4 demonstrates that Mr. O'Donnell's proposed equity cost rate of 4.50 percent is significantly below the average authorized equity cost rate over this time-period.

Chart 4: Recently Authorized Electric and Natural Gas Equity Cost Rates 2016-2017



VI. SUMMARY AND CONCLUSIONS

Q. Please summarize your conclusions and recommendations.

A. I conclude that Public Service's requested ROE of 9.75 percent for the GSMP II cost recovery mechanism is reasonable, if not conservative, based on the cost of equity analysis presented in AttachmentAEB-GSMPII-1R, which supports an authorized ROE between 10.00 percent and 10.80 percent, with a recommendation of 10.30 percent. Nothing in the testimony of Mr. O'Donnell has caused me to change my view regarding the appropriate ROE or capital structure for Public Service. For the reasons outlined in my Rebuttal Testimony, I find that Mr. O'Donnell's recommended ROE of 9.00 percent is not reasonable and does not meet the requirements of *Hope* and *Bluefield* for a just and reasonable return. Likewise, his proposed common equity ratio of 50.0 percent is based, in part, on his analysis of capital structure data at

the holding company level for both combination electric and gas utilities and gas distribution companies. The equity ratio of 51.2 percent that is relied on in the GSMP II filing is conservative in comparison to the equity ratios of the proxy group companies relied on in my analysis in the base rate filing. Considering the changes being brought about by Tax Reform and market changes, Mr. O'Donnell's capital structure recommendation 'goes the wrong way'. The Company should be increasing its equity percentage from its current 51.2 percent to support its targeted credit metric, not lowering it as Mr. O'Donnell suggests. The Company's requested equity ratio of 54 percent in the base rate case is well-supported by the proxy group of combination electric and gas utilities considered in my analysis.

Q. Does this conclude your Rebuttal Testimony?

A. Yes, it does.

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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PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DIRECT TESTIMONY
OF
ANN E. BULKLEY
SENIOR VICE PRESIDENT, CONCENTRIC ENERGY ADVISORS, INC.

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

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

Q. On whose behalf are you submitting this testimony?

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

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

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

Q. Please describe Concentric's activities in energy and utility engagements.

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

II. PURPOSE AND OVERVIEW OF TESTIMONY

Q. What is the purpose of your Direct Testimony?

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

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

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

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

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

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

structures of the utility operating company subsidiaries of the proxy group companies. Section X presents my conclusions and recommendations.

III. SUMMARY OF ANALYSES AND CONCLUSIONS

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

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

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%

The ROE estimation models are relied on to establish the range of returns for the proxy group. However, the appropriate ROE should not be based only on the calculation of the 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.

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

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

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

As in other jurisdictions, in this particular circumstance, there are reasons to exercise 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.

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

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

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

A. Company witness Michael Adams performed a benchmarking analysis, comparing 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.

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

Q. What were the conclusions from that analysis?

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

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

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

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

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

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

IV. REGULATORY GUIDELINES

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

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

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

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

> As the New Jersey Supreme Court has recognized, a privately owned public utility is a complex mechanism that exists to serve a public need 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.

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

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

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

Q. What are your conclusions regarding regulatory guidelines?

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

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[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.

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

V. CAPITAL MARKET CONDITIONS

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

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

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

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

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

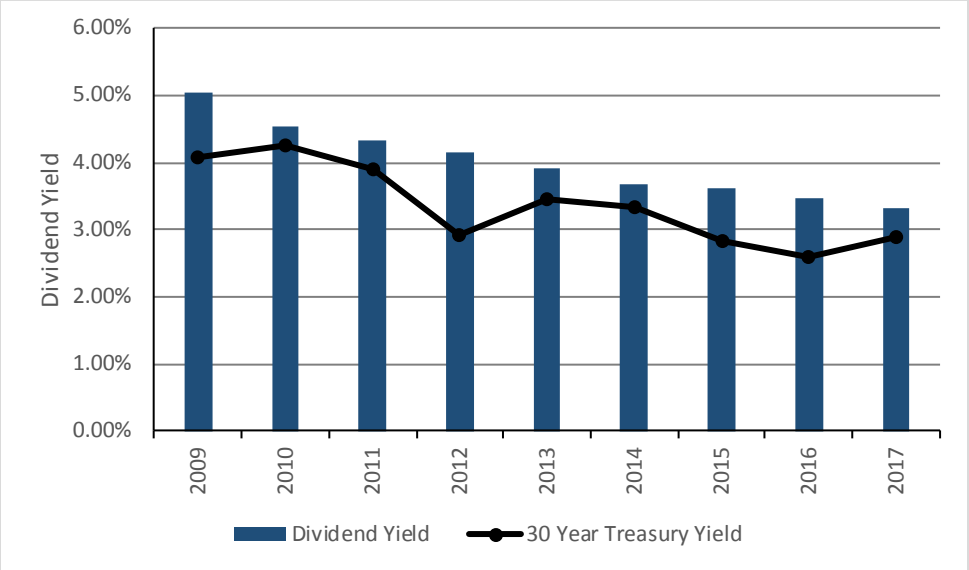
Q. How has the Federal Reserve's monetary policy affected capital markets in recent years?

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

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

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

Chart 1: Dividend Yields for Utility Stocks



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

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

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

***

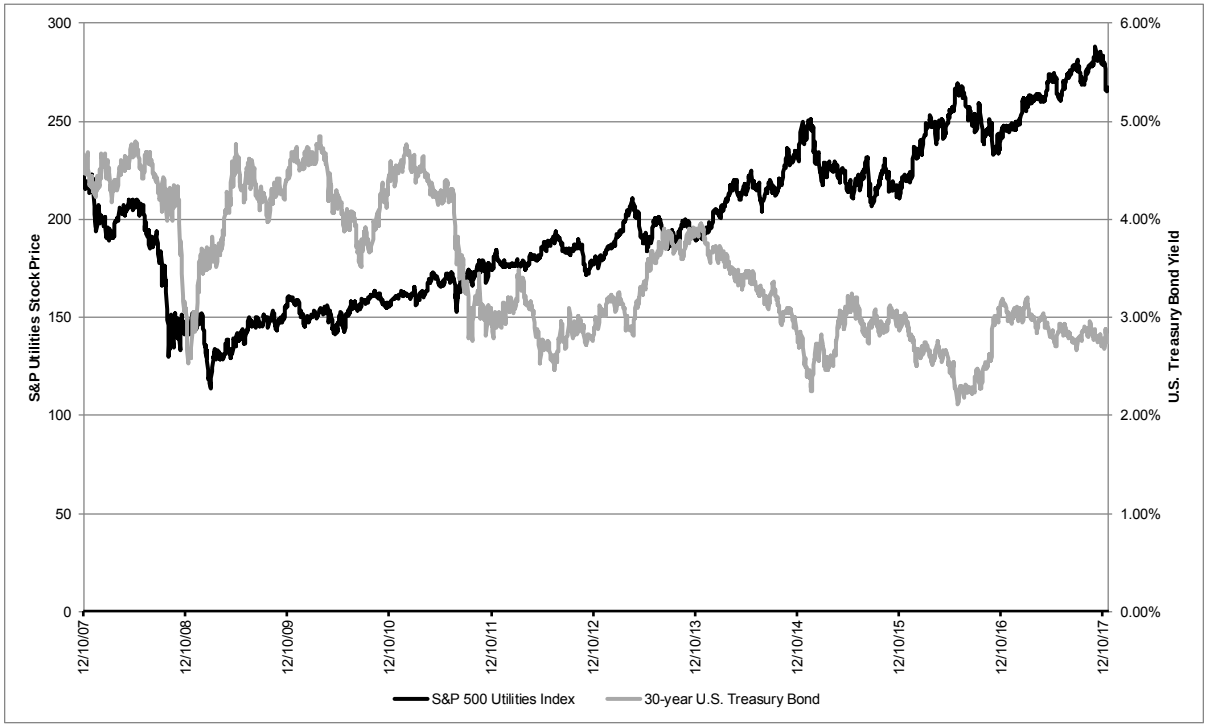
> The average dividend yield of stocks in the Electric Utility Industry is just 3.3%. Seeing yields below 3% is no longer unusual, and one equity, *MGE Energy*, has a yield of just 2%. Seeing a recent quotation above the upper end of our 2020-2022 Target Price Range is also no longer unusual. Although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

To assess how low interest rates are affecting the dividend yields for utility stocks, I 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.*

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

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



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

A. Members of the Federal Reserve have acknowledged that monetary policy has created abnormal capital market conditions. In September 2014, the Federal Reserve announced its plan to "normalize" monetary policy by, among other things, reducing its portfolio to minimize the effect of its holdings on "the allocation of credit across sectors of the

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

> Beginning the normalization of policy will be a significant step toward the restoration of the economy's normal dynamics, allowing monetary policy to respond to shocks without recourse to unconventional tools.[14]

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

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

> There is 'model risk' associated with the excessive reliance or mechanical application of a model when the surrounding conditions are outside of the normal range. 'Model risk' is the risk that a theoretical model that is used to value real world transactions fails to predict or represent the real phenomenon that is being modeled.[15]

In that same Opinion, the FERC noted that the low interest rates and bond yields that persisted throughout the March 2012 - October 2012 analytical period used in that case ("study period") resulted in anomalous market conditions and recognized the need to move 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.

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

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

> Though the Commission noted certain economic conditions in Opinion No. 531, the principle argument was based on low interest rates and bond yields, conditions that persisted throughout the [2015] study period. Consequently, we find that capital market conditions are still anomalous as described above…[16]
>
> ****
>
> Because the evidence in this proceeding indicates that capital markets continue to reflect the type of unusual conditions that the Commission identified in Opinion No. 531, we remain concerned that a mechanical application of the DCF methodology would result in a return inconsistent with *Hope* and *Bluefield*.[17]
>
> ****
>
> As the Commission found in Opinion No. 531, under these circumstances, we have less confidence that the midpoint of the zone of reasonableness in this proceeding accurately reflects the equity returns necessary to meet the *Hope* and *Bluefield* capital attraction standards. We therefore find it necessary and reasonable to consider additional record evidence, including evidence of alternative methodologies…[18]

[16] FERC Docket No. EL14-12-002, Opinion No. 551, at para. 121.
[17] *Id*., at para. 122.
[18] *Id*.

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

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

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

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

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

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

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

The PPUC ultimately concluded:

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

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

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

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

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

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

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

A. Chart 2 (below) summarizes the Federal Funds probabilities developed by CME group. The probability of a rate hike is calculated by adding the probabilities of all target rate levels above the current target rate. The current target Federal Funds rate is 150 bps after 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.

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

Chart 2: Investor Expectations of Future Federal Funds Rate Increases[26]

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%

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

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

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

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

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

VI. PROXY GROUP SELECTION

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

A. In this proceeding, I am estimating the cost of equity for Public Service, a rate-regulated subsidiary of PSEG. Since the ROE is a market-based concept, and given the 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.

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

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

Q. Please provide a brief profile of Public Service.

A. Public Service is a wholly-owned subsidiary of PSEG that provides electric transmission and distribution services to approximately 2.2 million retail customers and gas distribution service to approximately 1.8 million retail customers in New Jersey, including the six largest cities.[28] Public Service accounted for approximately 68 percent of PSEG's net income on average over the period from 2014-2016.[29] Public Service's current long-term issuer ratings are: (1) S&P BBB+ (Outlook: Stable); and (2) Moody's Investor's Service 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.

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

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

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

Q. Did you include PSEG in your analysis?

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

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

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

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

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

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

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

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

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

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

Table 4: Proxy Group 2016 Operating Income[31]

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%

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

VII. COST OF EQUITY ESTIMATION

Q. Please briefly discuss the ROE in the context of the regulated Rate of Return ("ROR").

A. The overall ROR for a regulated utility is based on its weighted average cost of capital, in which the costs of the individual sources of capital are weighted by their respective book values. While the costs of debt and preferred stock can be directly observed, the cost of 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.

Q. How is the required ROE estimated?

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

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

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

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

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

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

A. Constant Growth DCF Model

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

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

Q. Please describe the DCF approach.

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

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

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

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

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.

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

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.

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

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.

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

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

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

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

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

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

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

B. Projected Constant Growth DCF Model

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

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

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

C. Discounted Cash Flow Results

Q. Please summarize the results of your DCF analyses.

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

Table 5: Summary of DCF Results[34]

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

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

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

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

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

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

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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.

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

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

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

D. CAPM Analysis

Q. Please briefly describe the Capital Asset Pricing Model.

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

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

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

Where:

K_e = the required market ROE;
β = the Beta coefficient of an individual security;
r_f = the risk-free rate; and
r_m = the required return on the market as a whole.

In this specification, the term ($r_m - r_f$) represents the Market Risk Premium. According to the theory underlying the CAPM, since unsystematic risk can be diversified away, investors should only be concerned with systematic risk. Systematic risk is measured by Beta, which measures the volatility of a security as compared to the overall market. Beta is defined as:

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

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

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

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

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

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

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

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

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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.

Q. What are the results of your CAPM analysis?

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

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%**

E. Bond Yield Plus Risk Premium Analysis

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

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

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

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

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

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

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

[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.

Where:

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

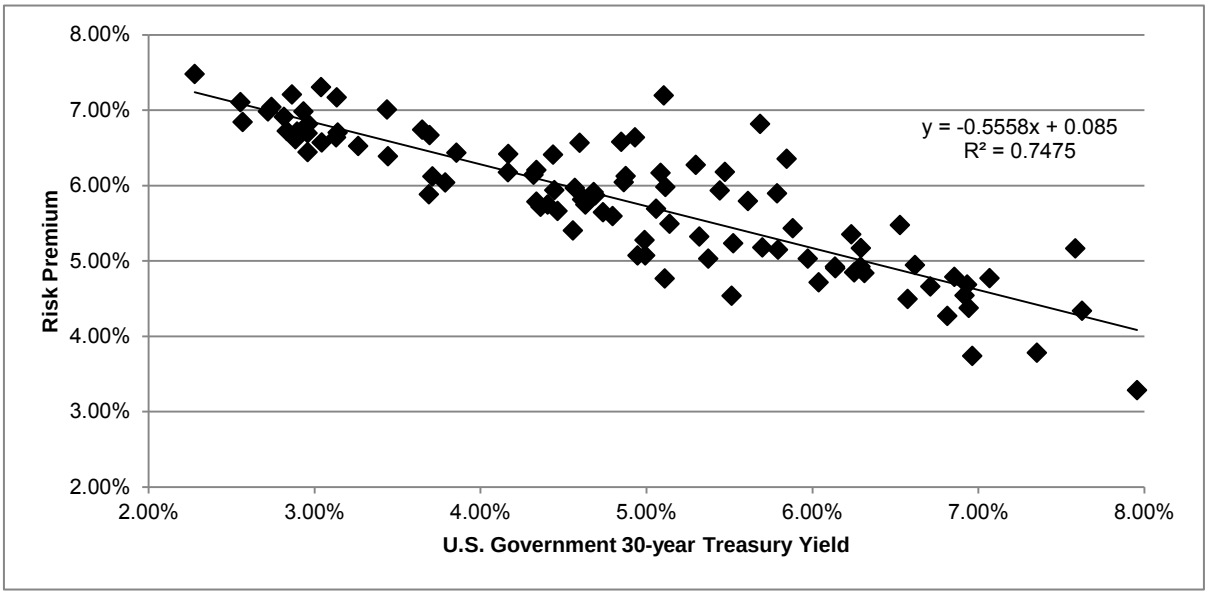
a = intercept term

b = slope term

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

Data regarding allowed ROEs were derived from the electric utility rate case decisions from 1992 through December 2017 as reported by Regulatory Research Associates. This equation's coefficients were statistically significant at the 99.0 percent confidence interval.

Chart 3: Risk Premium Results



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

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

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

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

VIII. BUSINESS OPERATIONS

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

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

A. Management Performance Recognition

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

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

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

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

Q. Please summarize the results of that analysis.

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

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

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

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

B. Regulatory Environment

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

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

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

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

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

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

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

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

Q. How would you characterize Public Service's risk relative to the proxy group companies?

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

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

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

IX. CAPITAL STRUCTURE

Q. What is Public Service's proposed capital structure?

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

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

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

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

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

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

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

X. CONCLUSIONS AND RECOMMENDATION

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

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

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

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

Q. Does this conclude your Direct Testimony?

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

												All Proxy Group		
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
			Stock Price (2020 - 2022)											
Company	Ticker	Annualized Dividend (2020 - 2022)	High	Low	Mean	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

		[13]	[14]	[15]	[16]	[17]
Name	Ticker	% 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	UAA	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] % Total Market Cap	[14] Estimated Dividend Yield	[15] Cap-Weighted Dividend Yield	[16] Long-Term Growth Est.	[17] 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%
Cboe 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%
Freeport-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	GWW	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	HRL	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%

STANDARD AND POOR'S 500 INDEX

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	PFG	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	SYY	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	XRX	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%
Flowserve 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%

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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.
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	DGX	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

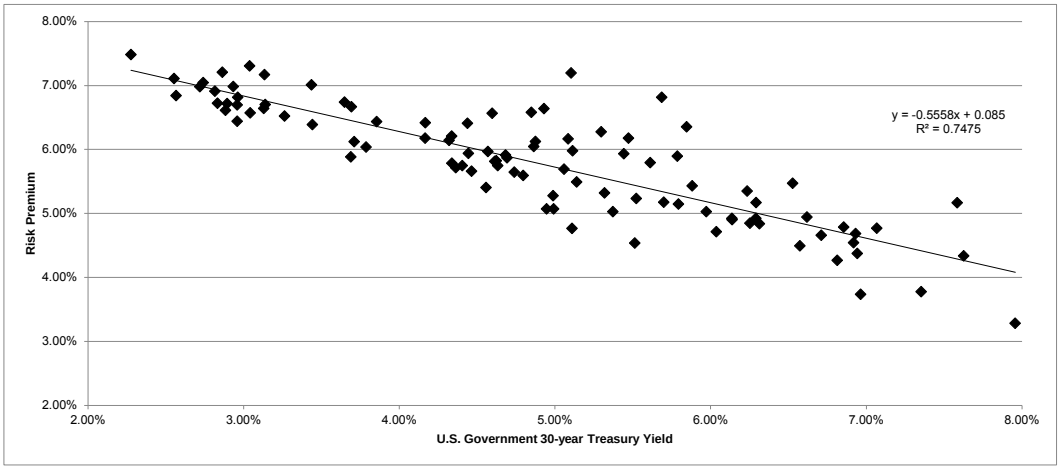
Name	Ticker	[13] % Total Market Cap	[14] Estimated Dividend Yield	[15] Cap-Weighted Dividend Yield	[16] Long-Term Growth Est.	[17] Cap-Weighted Long-Term Growth Est.
Mosaic Co/The	MOS	0.04%	0.39%	0.00%	13.45%	0.01%
Expedia Inc	EXPE	0.07%	1.00%	0.00%	14.60%	0.01%
Discovery Communications Inc	DISCA	0.01%	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	APTV	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 Rate	Value Line Beta	Market Risk Premium	ROE
[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] U.S. Govt. 30-year Treasury	[8] Risk Premium	[9] 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
	Missouri - Gas	Partially Forecast	N/A	No	Yes
Avangrid	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
CenterPoint Energy, Inc.	Arkansas - Gas	Partially Forecast	N/A	Full	Yes
	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
CMS Energy Corporation	Michigan - Electric	Fully Forecast	10.10	No	No
	Michigan - Gas	Fully Forecast	10.10	No	Yes
Consolidated Edison, Inc.	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
	Massachuetts - 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
WEC Energy Group	Illinois - Gas	Fully Forecast	9.05	Full	Yes
	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
Xcel Energy Inc.	Colorado - Electric	Historic	9.83	No	Yes
	Colorado - gas	Historic	9.50	Partial	Yes
	Minnesota - electric	Fully Forecast	9.20	Full	Yes
	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	
			Mean	Low	High				
Proxy Group Average	Fully Forecast	38	9.44%	8.64%	10.75%	Full	22	Yes	47
	Partially Forecast	5	9.50%	9.40%	9.60%	Partial	11	No	20
	Historic	24	9.77%	9.37%	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%	45.57%	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.

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
MICHAEL J. ADAMS

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

January 12, 2018
P-6

TABLE OF CONTENTS

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DIRECT TESTIMONY
OF
MICHAEL J. ADAMS
SENIOR VICE PRESIDENT, CONCENTRIC ENERGY ADVISORS, INC.

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Michael J. Adams. My business address is 293 Boston Post Road West, Suite 500, Marlborough, Massachusetts 01752.

Q. By who are you employed?

A. I am a Senior Vice President with Concentric Energy Advisors, Inc. ("Concentric").

Q. Please describe your educational background and experience.

A. A summary of my educational background and experience is set forth in Appendix A to my testimony.

Q. On whose behalf are you appearing in this proceeding?

A. I am submitting this direct testimony on behalf of Public Service Electric and Gas Company ("PSE&G" or "the Company").

Q. What is the purpose of your direct testimony?

A. I was retained by the Company to prepare benchmarking analyses evaluating the financial and operational performance of PSE&G's electric and gas business operations.

Q. Please describe the nature of the analyses that you performed to assess PSE&G's performance.

A. As I will discuss in greater detail below, I benchmarked PSE&G's electric business performance related to cost control, reliability and customer satisfaction against four peer groups to assess the Company's performance. Similarly, PSE&G's gas business cost control, effective deployment of resources, and customer satisfaction was benchmarked against four peer groups of comparable companies. The peer groups evaluated PSE&G's performance against national, regional and New Jersey companies, as well as the operating companies included in Company witness Bulkley's return on equity peer group.

Q. Please generally summarize your findings and conclusions based upon the results of the benchmarking analyses.

A. Overall, I found that both PSE&G's electric and gas businesses performed very well when compared to that of the peer groups, which indicates a well-managed company that is effectively focused on controlling costs and providing high levels of reliability and customer satisfaction.

Q. How are you proposing that the results of your benchmarking analyses be used in this rate proceeding?

A. I believe it is reasonable for the Board of Public Utilities (the "BPU") to consider the Company's performance in areas such as fiscal responsibility, operational performance, service quality and customer satisfaction when establishing the authorized return for the Company. Given PSE&G's strong performance in each of these areas, in my opinion, it is appropriate for the BPU to set PSE&G's ROE at the upper end of the range of return on

equity in recognition of the Company's consistently strong cost control, operational performance, service quality and customer satisfaction.

Q. Are you sponsoring any exhibits with your direct testimony?

A. Yes. I am sponsoring PSE&G Schedules MJA-1 through MJA-24 which are identified below and discussed in my testimony.

Schedules	**Description**
MJA-1	Electric Peer Group Composition
MJA-2	Gas Peer Group Composition
MJA-3	Distribution Operations and Maintenance ("O&M") expense per electric customer
MJA-4	Distribution O&M per MWh sold
MJA-5	Administrative and General ("A&G") expense per electric customer
MJA-6	A&G expense per MWh sold
MJA-7	Salaries, Wages, Pensions, and Benefits expense per employee
MJA-8	Total O&M (excluding transmission and production) expense per electric customer
MJA-9	Total O&M (excluding transmission and production) expense per MWh sold
MJA-10	Distribution O&M expense per gas customer
MJA-11	Distribution O&M per Mcf sold
MJA-12	A&G expense per gas customer
MJA-13	A&G expense per Mcf sold
MJA-14	Total Non-Production O&M expense per gas customer
MJA-15	Total Non-Production O&M expense per Mcf sold

MJA-16	SAIFI – BPU
MJA-17	CAIDI – BPU
MJA-18	SAIFI – IEEE
MJA-19	CAIDI – IEEE
MJA-20	SAIDI – IEEE
MJA-21	JD Power - Residential Electric Customers
MJA-22	JD Power - Business Electric Customers
MJA-23	JD Power - Residential Gas Customers
MJA-24	JD Power - Business Gas Customers

II. SOURCE DATA

Q. What years were included in the benchmarking analyses?

A. I used the most current publicly available information for PSE&G and the peer companies at the time the analyses were prepared. For both electric and gas businesses, information for the calendar years 2007 through 2016 was used for the benchmarking analyses.

Q. Against what peer groups did you benchmark PSE&G's electric business operations?

A. PSE&G was benchmarked against four separate peer groups. The "Electric Group" included all operating companies classified by SNL as "Electric Utility" or "Diversified Utility" which owned no regulated generation, and had a customer count of more than

500,000. The "Electric Group" included either 20 or 21 companies in each year of the analyses.[1,2]

The "Regional Group" included all companies in the "Electric Group" having electric distribution operations in Connecticut, Delaware, Maryland, New Jersey, New York, or Pennsylvania. The "Regional Group" included 15 companies for each year of the analyses.

The "New Jersey Group" included all companies with electric distribution operations in New Jersey. The "New Jersey Group" included four companies for each year of the analyses.

The Return on Equity ("ROE") proxy group included the operating electric companies owned by the holding companies included in Company witness Bulkley's cost of capital recommendation. The "ROE Proxy Group" included 25 companies from 2010-2016, 24 companies in 2008 and 2009 and 23 companies in 2007.[3]

The companies included in each electric peer group are set forth on Schedule MJA-1.

Q. What companies were included in the benchmarking of PSE&G's gas business?

A. PSE&G was benchmarked against four separate peer groups. The "LDC Group" included all natural gas distribution companies with a customer count of more than 500,000. The LDC Group included 40 companies.[4]

[1] Ameren Illinois was officially created in 2010 and hence does not have data prior to 2010.

[2] The number of companies included in the Salaries, Wages, Pensions, and Benefits expense per employee calculation are slightly lower for each proxy group due to availability of data.

[3] As noted earlier, Ameren Illinois was officially created in 2010. Black Hills Colorado Electric Utility Company, LP was created in 2008 and does not have data for 2007.

[4] The number of companies included in the analysis varied between 37 to 40 due to data availability for certain metrics in certain years.

The "Regional Group" included all companies in the "LDC Group" having natural gas distribution operations in Connecticut, Delaware, Maryland, New Jersey, New York, or Pennsylvania. There were 11 companies in the Regional Group.

The "New Jersey Group" included all companies with natural gas distribution operations in New Jersey. The "New Jersey Group" included four companies for each year of the analyses.

The Return on Equity ("ROE") proxy group included the operating gas companies owned by the holding companies included in Company witness Bulkley's cost of capital recommendation. The "ROE Proxy Group" included 41 companies.[5]

The companies included in the gas company peer groups are set forth in Schedule MJA-2.

Q. Is the information that you used to benchmark PSE&G's electric and gas operations publicly available?

A. Yes. All of the information that was used in the benchmarking analyses was obtained from publicly available sources. The data relied upon for my analyses was obtained from the Federal Energy Regulatory Commission ("FERC"); Energy Information Administration ("EIA"); and filings made with the various state regulatory commissions including the New Jersey BPU.

[5] The number of companies included in the analysis varied between 34 to 41 due to data availability for certain metrics in certain years.

Q. What modifications were made to the data contained in the publicly available information to complete the benchmarking analyses?

A. No modifications or manipulations were made to the data contained in the referenced sources. To ensure that the data was comparable, each metric was compared on a cost per customer basis (i.e., the reported expense level was divided by the reported total number of customers) or a per unit sold basis (i.e., per mega-watt hour ("MWh") sold for the electric business or per million cubic feet ("Mcf") sold for the gas business).

III. ELECTRIC BENCHMARKING ANALYSES

Q. What metrics did you use to evaluate PSE&G's operational performance against that of the peer companies?

A. The following metrics were used to evaluate PSE&G's electric business performance against that of its peer companies:

1. Distribution Operations and Maintenance ("O&M") expense per electric customer;
2. Distribution O&M per MWh sold;
3. Administrative and General ("A&G") expense per electric customer;
4. A&G expense per MWh sold;
5. Salaries, Wages, Pensions, and Benefits expense per employee;
6. Total O&M (excluding transmission and production) expense per electric customer; and
7. Total O&M (excluding transmission and production) expense per MWh sold.

Q. Please explain why it is appropriate to evaluate PSE&G's performance based upon the metrics set forth above.

A. The items that most directly impact customers' perceptions and experiences with their utility company revolve around costs (which are a driver of rates), service reliability, and how well the utility responds when the customer has an issue pertaining to their service. For that reason, I chose the metrics which I believe best evaluate PSE&G's performance in each of the above areas. The cost metrics were evaluated both on a cost per customer bases and a cost per unit sold bases (i.e., per MWh for the electric business and per Mcf for the gas business).

Q. How did PSE&G perform when compared to its peer companies on a distribution O&M expense per electric customer basis?

A. As shown on Schedule MJA-3, PSE&G's distribution O&M per customer ranged from a low of $68.23 in 2010 to a high of $79.53 in 2012. The Electric Group mean ranged from a low of $86.36 in 2009 to a high of $118.88 in 2016. The Regional Group mean ranged from a low of $89.28 in 2009 to a high of $123.21 in 2016. The New Jersey Group mean ranged from a low of $88.54 in 2009 to a high of $167.24 in 2016. The ROE Proxy Group mean ranged from a low of $94.88 in 2008 to a high of $128.95 in 2016. Therefore, PSE&G's electric distribution O&M expense per customer was consistently below (i.e., performed better than) the group means for each of the four comparison groups.

The cumulative average growth rate ("CAGR") of PSE&G's electric distribution O&M expenses per customer over the 10-year period examined was 0.53 percent. The Electric Group's CAGR over the same period was 2.95 percent, while the Regional Group's was 3.05 percent. The New Jersey Group's CAGR was 6.95 percent, while the ROE Proxy

Group's was 3.35 percent. Therefore, in each comparison, PSE&G's electric distribution O&M expenses increased at a lower rate over the period examined than those of the peer groups.

In 2016, PSE&G's electric distribution O&M expense per customer of $79.27 was approximately 33 percent lower than the Electric Group mean; 36 percent lower than the Regional Group mean; 53 percent lower than the New Jersey Group mean; and 39 percent lower than the ROE Proxy Group mean.

Q. How did PSE&G perform when compared to the peer companies on a distribution expense per MWh basis?

A. As shown on Schedule MJA-4, PSE&G's electric distribution O&M expense per MWh sold ranged from a low of $3.37 in 2010 to a high of $4.24 in 2016 over the ten-year period. The Electric Group mean ranged from a low of $3.86 in 2007 to a high of $5.58 in 2016 over the same period. The Regional Group mean ranged from a low of $4.06 in 2007 to a high of $6.19 in 2016 over the ten year period. The New Jersey Group mean ranged from a low of $4.31 in 2007 to a high of $8.64 in 2016. The ROE Proxy Group mean ranged from a low of $4.48 in 2007 to a high of $6.46 in 2016. Therefore, PSE&G's electric distribution O&M expense per megawatt-hour sold was consistently below (i.e., performed better than) the group means for each of the four comparison groups.

The CAGR of PSE&G's electric distribution O&M expenses per MWh sold over the 10-year period examined was 2.01 percent. The Electric Group's CAGR over the same period was 4.19 percent, while the Regional Group's was 4.80 percent. The New Jersey Group's CAGR was 8.05 percent, while the ROE Proxy Group's was 4.14 percent.

Therefore, PSE&G's electric distribution expense per MWh sold increased at a lower rate over the years examined than that of the peer groups.

In 2016, PSE&G's distribution O&M expense per MWh sold of $4.24 was approximately 24 percent lower than the Electric Group mean; 31 percent lower than the Regional Group mean; 51 percent lower than the New Jersey Group mean; and 34 percent lower than the ROE Proxy Group mean.

Q. Did you compare PSE&G's A&G expense per customer to those of the peer group means?

A. Yes. As shown on Schedule MJA-5, PSE&G's A&G expense per customer was well below the group means for each of the four comparison groups, for the years 2010 to 2016. For the years 2007 to 2009, PSE&G's A&G expense per customer was very close to the Electric Group and Regional Group mean, but well below the New Jersey Group mean and ROE Proxy Group mean.

PSE&G's A&G expense per customer ranged from a low of $71.26 in 2014 to a high of $106.07 in 2009. The Electric Group mean ranged from a low of $86.87 in 2008 to a high of $139.49 in 2016. The Regional Group mean ranged from a low of $89.70 in 2008 to a high of $150.25 in 2016. The New Jersey Group mean ranged from a low of $143.14 in 2007 to a high of $182.91 in 2011. The ROE Proxy Group mean ranged from a low of $163.05 in 2008 to a high of $196.38 in 2012. Therefore, PSE&G's A&G expense per customer was consistently below (i.e., performed better than) the group means for each of the four comparison groups.

The CAGR of PSE&G's A&G expense per customer over the 10-year period examined was -1.79 percent. The Electric Group's CAGR over the same period was 4.40 percent, while the Regional Group's was 4.92 percent. The New Jersey Group's CAGR was 2.42 percent, while the ROE Proxy Group's was 0.67 percent. Therefore, PSE&G's A&G expense per customer decreased over the years examined while the CAGR of each of the peer groups increased.

In 2016, PSE&G's A&G expense per customer of $86.47 was approximately 38 percent lower than the Electric Group mean; 42 percent lower than the Regional Group mean; 51 percent lower than the New Jersey Group mean; and 51 percent lower than the ROE proxy group mean.

Q. How did PSE&G perform when compared to the peer companies on an A&G expense per MWh basis?

A. As shown on Schedule MJA-6, PSE&G's electric A&G expense per MWh sold ranged from a low of $3.85 in 2014 to a high of $5.39 in 2009. The Electric Group mean ranged from a low of $3.85 in 2008 to $6.81 in 2016. The Regional Group mean ranged from a low of $4.09 in 2008 to $7.77 in 2016. The New Jersey Group mean ranged from a low of $6.43 in 2007 to a high of $9.20 in 2014. The ROE Proxy Group mean ranged from a low of $7.57 in 2007 to a high of $9.49 in 2012. Therefore, PSE&G's A&G expense per MWh sold was below (i.e., performed better than) the group means for most years of the four comparison groups.

The CAGR of PSE&G's A&G expense per MWh sold over the 10-year period examined was -0.34 percent. The Electric Group's CAGR over the same period was 6.08

percent, while the Regional Group's was 7.02 percent. The New Jersey Group's CAGR was 4.05 percent, while the ROE Proxy Group's was 1.04 percent. Again, PSE&G's A&G expense per MWh sold decreased over the years examined while the CAGR of each of the peer groups increased.

In 2016, PSE&G's A&G expense per MWh sold of $4.63 was approximately 32 percent lower than the Electric Group mean; 40 percent lower than the Regional Group mean; 50 percent lower than the New Jersey Group mean; and 44 percent lower than the ROE Proxy Group mean.

Q. Did you compare PSE&G's salaries, wages, pensions, and benefits expenses on a per employee basis to those of the peer companies?

A. Yes. As shown on Schedule MJA-7, PSE&G's salaries, wages, pensions, and benefits expense per employee ranged from a low of $104.66 in 2007 to a high of $126.74 in 2016. The Electric Group mean ranged from a low of $89.17 in 2007 to a high of $138.24 in 2015. The Regional Group mean ranged from a low of $87.24 in 2007 to a high of $137.62 in 2014. The New Jersey Group mean ranged from a low of $93.13 in 2007 to a high of $156.76 in 2014. The ROE Proxy Group mean ranged from a low of $113.44 in 2007 to a high of $163.45 in 2015.

The CAGR of PSE&G's salaries, wages, pensions and benefits expense per employee over the 10-year period examined was 2.15 percent. The Electric Group's CAGR over the same period was 4.52 percent, while the Regional Group's was 4.27 percent. The New Jersey Group's CAGR was 4.59 percent, while the ROE Proxy Group's was 3.67 percent.

Therefore, PSE&G's salaries, wages, pensions and benefits expense per employee increased at a lower rate over the years examined than that of the peer groups.

In 2016, PSE&G's salaries, wages, pensions, and benefits expense per employee of $126.74 was approximately 5 percent lower than the Electric Group mean; very similar to the Regional Group mean; 9 percent lower than the New Jersey Group mean; and 19 percent lower than the ROE Proxy Group mean.

Q. Is it a notable accomplishment that PSE&G's salaries, wages, pensions, and benefits expenses, on a per employee basis is less than those of its peer companies?

A. Yes. Given that the Northeast traditionally has higher wages, I believe that is a notable accomplishment that PSE&G's salaries, wages, pensions, and benefits expenses per employee are below not only that of the Regional and New Jersey group means, but also that of the Electric Group which includes companies across the country.

Q. How can you support the statement that wages in New Jersey are typically higher than those in other regions of the country?

A. The Consumer Price Index ("CPI") for Urban Wage Earners and Clerical Workers, as reported by the United States Bureau of Labor Statistics ("BLS") sets forth statistics for the Northeast, Midwest, South and West. The following table presents the reported information as of December 31, 2016 by region:

Region	CPI-Urban Wage Earners and Clerical Workers	Percent of Northeast
Northeast	252.622	100.0%
Midwest	220.938	87.5%

South	230.016	91.1%
West	241.098	95.4%

Q. Did you also compare PSE&G's total electric O&M expense to that of the peer groups?

A. Yes. Given that this is a distribution-only rate proceeding, for comparison purposes, I excluded both production and transmission O&M from the total O&M of each of the companies in the analyses.

Q. How did PSE&G's total O&M (excluding transmission and production expenses) per customer compare to that of the peer companies?

A. As shown on Schedule MJA-8, PSE&G's total O&M expense (excluding transmission and production) per customer ranged from a low of $318.53 in 2007 to a high of $397.25 in 2013. The Electric Group mean ranged from a low of $265.26 in 2007 to a high of $376.76 in 2016. The Regional Group mean ranged from a low of $279.71 in 2007 to a high of $397.97 in 2016. The New Jersey Group mean ranged from a low of $355.23 in 2007 to a high of $544.98 in 2016. The ROE Proxy Group mean ranged from a low of $345.36 in 2007 to a high of $450.42 in 2015.

The CAGR of PSE&G's total O&M expense (excluding transmission and production) per customer over the 10-year period examined was 0.83 percent. The Electric Group's CAGR over the same period was 3.98 percent, while the Regional Group's was 4.00 percent. The New Jersey Group's CAGR was 4.87 percent, while the ROE Proxy Group's was 2.61 percent. Therefore, PSE&G's total O&M expense (excluding transmission and production) per customer increased at a lower rate over the years examined than that of the peer groups.

In 2016, PSE&G's total electric O&M (excluding transmission and production) per customer of $343.01 was approximately 9 percent lower than the Electric Group mean; 14 percent lower than the Regional Group mean; 37 percent lower than the New Jersey Group mean; and 21 percent lower than the ROE Proxy Group mean.

Q. Did the comparison of PSE&G's total O&M expenses (excluding transmission and production) per MWh sold basis produce similar results?

A. Yes. As shown on Schedule MJA-9, PSE&G's total electric O&M expenses (excluding transmission and production) per MWh sold ranged from a low of $14.96 in 2007 to a high of $21.11 in 2013. The Electric Group mean ranged from a low of $11.34 in 2007 to a high of $18.20 in 2016. The Regional Group mean ranged from a low of $12.19 in 2007 to a high of $20.28 in 2014. The New Jersey Group mean ranged from a low of $16.49 in 2007 to a high of $28.51 in 2016. The ROE Proxy Group mean ranged from a low of $16.03 in 2007 to a high of $22.18 in 2015.

The CAGR of PSE&G's total electric O&M expenses (excluding transmission and production) per MWh over the 10-year period examined was 2.31 percent. The Electric Group's CAGR over the same period was 5.39 percent, while the Regional Group's was 5.75 percent. The New Jersey Group's CAGR was 6.27 percent, while the ROE Proxy Group's was 3.36 percent. Therefore, PSE&G's total O&M expense (excluding transmission and production) per MWh increased at a lower rate over the years examined than that of the peer groups.

In 2016, PSE&G's total electric O&M expenses (excluding transmission and production) per MWh sold of $18.37 was very similar to the Electric Group mean; 9 percent

lower than the Regional Group mean; 36 percent lower than the New Jersey Group mean; and 15 percent lower than the ROE Proxy Group mean.

IV. GAS BENCHMARKING ANALYSES

Q. Have you also benchmarked the performance of PSE&G's gas operations?

A. Yes, I have.

Q. What metrics did you use to evaluate the operational performance of PSE&G's gas business against that of its peer companies?

A. The following metrics were used to evaluate PSE&G's gas business performance against that of the peer groups:

1. Distribution O&M expense per gas customer;
2. Distribution O&M per Mcf sold;
3. A&G expense per gas customer;
4. A&G expense per Mcf sold;
5. Total Non-Production O&M expense per gas customer; and
6. Total Non-Production O&M expense per Mcf Sold.

Q. Prior to discussing the specific analyses that were prepared, can you discuss how PSE&G's gas business performed when benchmarked against its peer companies?

A. Certainly. PSE&G's gas business was benchmarked against an LDC Group, Regional Group, New Jersey Group, and an ROE Proxy Group. PSE&G and the peer groups were evaluated based upon their respective performance over the most recent 10-year period

for which data was publicly available. As will be discussed below, PSE&G's gas business performed well against each of the peer groups.

Q. For what years have you benchmarked PSE&G's gas business performance?

A. PSE&G's gas business performance was benchmarked against its peer companies for the years 2007 through 2016.

Q. How did PSE&G's gas business perform when compared to its peer companies on a distribution O&M expense per customer basis?

A. As shown on Schedule MJA-10, PSE&G's gas distribution O&M expense per customer was below (i.e., better than) the group mean for the LDC Group, Regional Group, and the ROE Proxy Group, in each year of the analysis. PSE&G's gas distribution O&M expense per customer was lower than the New Jersey Group mean for the most recent five years, 2012 to 2016. PSE&G's gas distribution O&M per gas customer ranged from a low of $42.42 in 2012 to a high of $55.55 in 2016. The LDC Group mean ranged from a low of $62.99 in 2007 to a high of $83.89 in 2016. The Regional Group mean ranged from a low of $76.91 in 2007 to a high of $114.59 in 2016. The New Jersey Group mean for the gas companies ranged from a low of $39.38 in 2007 to a high of $57.84 in 2016. The ROE Proxy Group mean for the gas companies ranged from a low of $66.55 in 2008 to a high of $101.02 in 2014.

The CAGR of PSE&G's gas distribution O&M expenses per customer over the 10-year period examined was 1.39 percent. The LDC Group's CAGR over the same period was 3.24 percent, while the Regional Group's was 4.53 percent. The New Jersey Group's CAGR was 4.36 percent, while the ROE Proxy Group's was 3.69 percent. Therefore, PSE&G's gas

distribution O&M expense per customer increased at a lower rate over the years examined than that of the peer groups.

In 2016, PSE&G's gas distribution O&M expense per customer of $55.55 was approximately 34 percent lower than the LDC Group mean; 52 percent lower than the Regional Group mean; 4 percent lower than the New Jersey Group mean; and 42 percent lower than the ROE Proxy Group mean.

Q. How did PSE&G perform when compared to the peer groups on a gas distribution expense per Mcf sold basis?

A. As shown on Schedule MJA-11, PSE&G's gas distribution O&M expense per Mcf sold was below (i.e., better than) the group mean for the LDC Group, Regional Group, and the ROE Proxy Group, in each year of the analysis. PSE&G's gas distribution O&M expense per Mcf was lower than the New Jersey Group mean for the most recent seven years (i.e. 2010 to 2016). PSE&G's gas distribution O&M expense per Mcf sold ranged from a low of $0.25 in 2014 to a high of $0.37 in 2016. The LDC Group mean ranged from a low of $0.42 in 2007 to a high of $0.60 in 2016. The Regional Group mean ranged from a low of $0.51 in 2007 to a high of $0.81 in 2016. The New Jersey Group mean ranged from a low of $0.27 in 2007 to a high of $0.45 in 2016. The ROE Proxy Group mean ranged from a low of $0.40 in 2008 to a high of $0.57 in 2016.

The CAGR of PSE&G's total gas distribution O&M expenses per Mcf sold over the 10-year period examined was 2.57 percent. The LDC Group's CAGR over the same period was 4.09 percent, while the Regional Group's was 5.23 percent. The New Jersey Group's CAGR was 5.93 percent, while the ROE Proxy Group's was 3.22 percent. Therefore,

PSE&G's gas distribution O&M expense per Mcf increased at a lower rate over the years examined than that of the peer groups.

In 2016, PSE&G's gas distribution O&M expense per Mcf sold of $0.37 was approximately 39 percent lower than the LDC Group mean; 55 percent lower than the Regional Group mean; 18 percent lower than the New Jersey Group mean; and 35 percent lower than the ROE Proxy Group mean.

Q. Did PSE&G compare well on an A&G expense per gas customer basis when compared to the peer groups?

A. Yes. As shown on Schedule MJA-12 , PSE&G's A&G expense per gas customer was below (i.e., better than) the group mean for each of the four comparison groups in every year of the analysis. PSE&G's A&G expense per gas customer ranged from a low of $51.35 in 2014 to a high of $83.75 in 2009. The LDC Group mean ranged from a low of $83.25 in 2008 to a high of $104.77 in 2016. The Regional Group mean ranged from a low of $112.66 in 2008 to a high of $155.24 in 2016. The New Jersey Group mean ranged from a low of $104.65 in 2008 to a high of $157.80 in 2016. The ROE Proxy Group mean ranged from a low of $82.83 in 2008 to a high of $110.09 in 2015.

The CAGR of PSE&G's A&G expenses per customer over the 10-year period examined was -2.79 percent. The LDC Group's CAGR over the same period was 2.07 percent, while the Regional Group's was 3.29 percent. The New Jersey Group's CAGR was 4.65 percent, while the ROE Proxy Group's was 1.39 percent. Therefore, PSE&G's A&G expense per gas customer decreased over the years examined while the CAGR of each of the peer groups increased. In 2016, PSE&G's A&G expense per gas customer of $58.05 was

approximately 45 percent lower than the LDC Group mean; 63 percent lower than the Regional Group mean; 63 percent lower than the New Jersey Group mean; and 41 percent lower than the ROE Proxy Group mean.

Q. How did PSE&G compare in the comparison of gas A&G expense per Mcf sold?

A. As shown on Schedule MJA-13, PSE&G's A&G expense per Mcf sold was below (i.e., better than) the group mean for each of the four comparison groups in every year of the analysis. PSE&G's A&G expense per Mcf sold ranged from a low of $0.27 in 2014 to a high of $0.50 in 2009. The LDC Group mean ranged from a low of $0.55 in 2008 to a high of $0.76 in 2016. The Regional Group mean ranged from a low of $0.76 in 2008 to a high of $1.14 in 2016. The New Jersey Group mean ranged from a low of $0.66 in 2007 to a high of $1.15 in 2016. The ROE Proxy Group mean ranged from $0.47 in 2008 to a high of $0.60 in 2012.

The CAGR of PSE&G's A&G expenses per Mcf sold over the 10-year period examined was -1.66 percent. The LDC Group's CAGR over the same period was 3.25 percent, while the Regional Group's was 4.41 percent. The New Jersey Group's CAGR was 6.49 percent, while the ROE Proxy Group's was 1.51 percent. Therefore, while PSE&G's A&G expense per Mcf sold decreased over the years examined while the CAGR of each of the peer groups increased.

In 2016, PSE&G's A&G expense per Mcf sold of $0.38 was approximately 50 percent lower than the LDC Group mean; 66 percent lower than the Regional Group mean; 67 percent lower than the New Jersey Group mean; and 33 percent lower than the ROE Proxy Group mean.

Q. How did PSE&G's total non-production O&M per gas customer compare to that of the peer companies?

A. As shown on Schedule MJA-14, PSE&G's total non-production O&M expense per gas customer ranged from a low of $226.50 in 2016 to a high of $277.07 in 2013. The LDC Group mean ranged from a low of $234.13 in 2007 to a high of $282.81 in 2016. The Regional Group mean ranged from a low of $289.99 in 2007 to a high of $374.79 in 2016. The New Jersey Group mean ranged from a low of $219.79 in 2007 to a high of $325.70 in 2014. The ROE Proxy Group mean ranged from a low of $252.09 in 2008 to a high of $319.32 in 2014.

The CAGR of PSE&G's total non-production gas O&M expense per customer over the 10-year period examined was -1.17 percent. The LDC Group's CAGR over the same period was 2.12 percent, while the Regional Group's was 2.89 percent. The New Jersey Group's CAGR was 3.80 percent, while the ROE Proxy Group's was 1.31 percent. Therefore, PSE&G's total non-production gas O&M expense per customer decreased over the years examined while the CAGR of each of the peer groups increased. In 2016, PSE&G's total non-production O&M per gas customer of $226.50 was approximately 20 percent lower than LDC Group mean; 40 percent lower than the Regional Group mean; 26 percent lower than the New Jersey Group mean; and 23 percent lower than the ROE Proxy Group mean.

Q. Did the comparison of PSE&G's total non-production O&M expenses per Mcf sold bases produce similar results?

A. Yes. As shown on Schedule MJA-15, PSE&G's total non-production O&M expenses per Mcf sold ranged from a low of $1.30 in 2014 to a high of $1.65 in 2013. The LDC

Group mean ranged from a low of $1.54 in 2007 to a high of $2.06 in 2016. The Regional Group mean ranged from a low of $1.93 in 2007 to a high of $2.69 in 2016. The New Jersey Group mean ranged from a low of $1.44 in 2007 to a high of $2.34 in 2016. The ROE Proxy Group mean ranged from a low of $1.56 in 2008 to a high of $1.86 in 2012.

The CAGR of PSE&G's total non-production O&M expenses per Mcf over the 10-year period examined was -0.02 percent. The LDC Group's CAGR over the same period was 3.31 percent, while the Regional Group's was 3.78 percent. The New Jersey Group's CAGR was 5.53 percent, while the ROE Proxy Group's was 1.01 percent. Therefore, PSE&G's total non-production O&M expenses per Mcf decreased over the years examined while the CAGR of each of the peer groups increased. In 2016, PSE&G's total non-production O&M expenses per Mcf sold of $1.49 was approximately 28 percent lower than the LDC Group mean; 44 percent lower than the Regional Group mean; 36 percent lower than the New Jersey Group mean; and 17 percent lower than the ROE Proxy Group mean.

V. RELIABILITY

Q. Beyond PSE&G's financial performance, did you compare PSE&G's operational performance to that of other electric companies?

A. Yes. I reviewed PSE&G's reported System Average Interruption Frequency Index ("SAIFI") and Customer Average Interruption Duration Index ("CAIDI") to those of the other New Jersey electric companies as reported to the BPU. I also compared PSE&G's SAIFI, CAIDI, and System Average Interruption Duration Index ("SAIDI") to those reported to the Institute of Electrical and Electronics Engineers ("IEEE").

Q, What does the SAIFI metric represent?

A. SAIFI is the average number of interruptions that a customer would experience during a period, which in the case of the New Jersey data, reflects a calendar year.

Q. How did PSE&G's SAIFI performance compare to that of the other New Jersey electric companies?

A. As shown on Schedule MJA-16, for the years 2006 through 2015, PSE&G's reported SAIFI was consistently below the mean of the reported SAIFI of the other New Jersey electric companies. PSE&G's SAIFI ranged from 0.58 in 2015 to 0.84 in 2010. The mean of the reported SAIFI numbers for the New Jersey utilities ranged from 0.94 in 2015 to 1.50 in 2006. Therefore, PSE&G's electric customers, on average, experienced interruptions of service less frequently than the customers of the other New Jersey utilities.

Q. What does the CAIDI metric represent?

A. CAIDI measures the average restoration time during an outage, and is most often reported in minutes.

Q. How did PSE&G's CAIDI performance compare to that of the other New Jersey electric companies?

A. As shown on Schedule MJA-17, for the years 2006 through 2015, PSE&G's reported CAIDI ranged from 56.39 in 2015 to 76.28 in 2014. The mean of the reported CAIDI numbers for the other New Jersey utilities ranged from 96.70 in 2015 to 120.93 in 2006. Based upon the reported figures, not only did PSE&G's customers experience fewer interruptions; if interruptions were experienced, PSE&G's customers' power was restored more quickly than the power of other companies' customers.

Q. Does the IEEE also collect and report data for SAIFI and CAIDI of electric utilities in the United States.

A. Yes. The IEEE initiated a benchmarking study in 2003 and the study is conducted annually. Participants are anonymous and are identified by key identifier only, to retain anonymity. While the participation list is not revealed, each participant can choose to share its results.

Q. Have you compared PSE&G's performance to the IEEE's 2016 study results?

A. Yes.

Q. Please describe how PSE&G's SAIFI performance for the years 2009 to 2015 compared to data reported by the IEEE.

A. As shown on Schedule MJA-18, PSE&G's reported SAIFI was in the first quartile of the SAIFI reported by the IEEE during each of the years 2009 to 2015. PSE&G's SAIFI ranged from 0.64 in 2015 to 0.89 in 2011.

Q. Why are PSE&G's SAIFI figures reported in the IEEE study different than those reported to the New Jersey Board of Public Utilities, as you discussed previously?

A. The NJ BPU and IEEE have different definitions regarding major events and how they are established and as a result, the SAIFI figures are different.

Q. Does the IEEE also report CAIDI figures?

A. Yes. As shown on Schedule MJA-19, PSE&G's reported CAIDI was again solidly in the first quartile when compared to the companies participating in the IEEE study. PSE&G's CAIDI ranged from 61 in 2015 to 78 in 2011.

Q. Does the IEEE study also benchmark utilities' System Average Interruption Duration Index ("SAIDI")?

A. Yes. While CAIDI reports duration on a customer basis, SAIDI reports duration on a system-wide basis.

Q. How did PSE&G's SAIDI compare to the IEEE study participants?

A. As shown on Schedule MJA-20, PSE&G's SAIDI was also in the first quartile of metrics reported in the IEEE study for all years examined. PSE&G's SAIDI ranged from 39 in 2015 to 69 in 2011.

VI. CUSTOMER SATISFACTION

Q. What customer satisfaction information did you review?

A. JD Power conducts and reports the results of annual customer satisfaction surveys. PSE&G is included in JD Power's Customer Satisfaction Studies in the "Large Utility East" segment. JD Power conducts customer satisfaction surveys of (1) electric residential customers; (2) electric business customers; (3) gas residential customers; and (4) gas business customers.

Q. Based upon JD Power's reported results for the years 2012 through 2016, where did PSE&G rank based upon the feedback from electric residential customers?

A. As shown on Schedule MJA-21, PSE&G ranked in the first quartile or at the top of the second quartile by its electric residential customers in each of years 2012 through 2016. In results released by JD Power in July 2017, electric residential customers ranked PSEG in the first quartile (and third overall) with a rating of 727.

Q. How did PSE&G rank based upon JD Power's survey of its electric business customers during the years 2012 through 2016?

A. Once again, as shown on Schedule MJA-22, PSE&G was ranked in the first quartile or at the top of the second quartile by its electric business customers during each of the years, 2012 through 2016, and it improved year-over-year each year during that time period. PSE&G was ranked in the second quartile by its electric business customers in 2017.

Q. Based upon JD Power's reported results for the years 2012 through 2016, where did PSE&G rank based upon the feedback from its gas residential customers?

A. As shown on Schedule MJA-23, PSE&G was ranked just below first quartile by its gas residential customers in each of years 2012 through 2016. It should also be noted that PSE&G's gas residential customer satisfaction rating improved year-over-year each year from 2012 to 2016. In results released by JD Power in September 2017, gas residential customers ranked PSEG in the first quartile (and third overall) with a rating of 736.

Q. How did PSE&G rank based upon JD Power's survey of its gas business customers during the years 2012 through 2016?

A. As shown on Schedule MJA-24, PSE&G's gas business customer satisfaction rating improved year-over-year each year from 2012 to 2016. JD Power Gas Business results are expected to be released on or about January 16, 2018.

VII. SUMMARY AND CONCLUSIONS

Q. What are your conclusions based upon the analyses that you prepared?

A. PSE&G's O&M costs of the gas and electric businesses compare favorably to those of peer group averages. Similarly, PSE&G's reliability and customer satisfaction scores indicate strong performance and a focus on improvement.

Given PSE&G's strong performance, as set forth in my testimony, I am recommending that the results of the benchmarking analyses be considered by Company witness Ann Bulkley when establishing her recommended range of return on equity values for PSE&G's electric and gas businesses. In my opinion, it is appropriate for the BPU to set PSE&G's ROE at the upper end of the range of return on equity in recognition of the Company's consistently strong cost control, operational performance, service quality and customer satisfaction performance. Therefore, I recommend that PSE&G's authorized return on equity be established at a level that reflects PSE&G's strong performance and cost management in an operating environment where costs tend to be higher, the system is older, and access to maintain the system can be challenging.

Q. Does this conclude your direct testimony?

A. Yes, it does.

Background and Qualifications
of
Michael J. Adams
Senior Vice President

Michael J. Adams has over thirty-five years of direct experience in the public utility industry. He has worked for an investor-owned utility, a regulatory agency, and most recently as a consultant to the utility industry. As a consultant, Mr. Adams has provided expert testimony or reports before the Arkansas Public Service Commission; the Connecticut Public Utilities Regulatory Authority, the Federal Energy Regulatory Commission (FERC); the Hawaii Public Utility Commission; the Idaho Public Utilities Commission; the Illinois Commerce Commission; the Maine Public Utilities Commission, the Maryland Public Service Commission; the Massachusetts Department of Telecommunications and Energy; the Missouri Public Service Commission; the New Hampshire Public Utilities Commission; the Oklahoma Corporation Commission; the Ontario Energy Board; the Pennsylvania Public Utility Commission; the Public Utilities Commission of Texas; the Tennessee Public Service Commission, and the State Corporation Commission of Virginia.

PROFESSIONAL HISTORY

Concentric Energy Advisors, Inc. (2007 – Present)
Senior Vice President
Vice President

Navigant Consulting, Inc. (1995 – 2007)
Managing Director

Illinois Commerce Commission (1983 – 1995)
Deputy Executive Director

Illinois Power Company (1981 – 1983)

EDUCATION

M.B.A., Finance, University of Illinois, Springfield
B.S., Accounting, Illinois College

DESIGNATIONS AND PROFESSIONAL AFFILIATIONS

Certified Public Accountant
American Institute of Public Accountants
Illinois Society of Certified Public Accountants

EXHIBIT P-6
Schedule MJA-1

Companies Included in Electric Comparisons

	Company	Electric Distribution	Electric Group	Regional Group	New Jersey Group	ROE Proxy Group
*	Ameren Illinois Company	IL	✓			✓
	Atlantic City Electric Company	NJ	✓	✓	✓	
	Baltimore Gas and Electric Company	MD	✓	✓		
**	Black Hills Colorado Electric Utility Company, LP	CO				✓
	Black Hills Power, Inc.	MT, SD, WY				✓
	CenterPoint Energy Houston Electric, LLC	TX	✓			✓
	Cheyenne Light, Fuel and Power Company	WY				✓
	Cleveland Electric Illuminating Company	OH	✓			
	Commonwealth Edison Company	IL	✓			
	Connecticut Light and Power Company	CT	✓	✓		✓
	Consolidated Edison Company of New York, Inc.	NY				✓
	Consumers Energy Company	MI				✓
	Delmarva Power & Light Company	DE, MD	✓	✓		
	DTE Electric Company	MI				✓
	Duquesne Light Company	PA	✓	✓		
	Jersey Central Power & Light Company	NJ	✓	✓	✓	
	Metropolitan Edison Company	PA	✓	✓		
	New York State Electric & Gas Corporation	NY				✓
	Niagara Mohawk Power Corporation	NY	✓	✓		
	Northern States Power Company - MN	MN, ND, SD				✓
	Northern States Power Company - WI	MI, WI				✓
	NorthWestern Corporation	MT, SD, WY				✓
	NSTAR Electric Company	MA	✓			✓
	Ohio Edison Company	OH, PA	✓	✓		
	Oncor Electric Delivery Company LLC	TX	✓			
	Orange and Rockland Utilities, Inc.	NJ, NY, PA				✓
	PECO Energy Company	PA	✓	✓		
	Pennsylvania Electric Company	NY, PA	✓	✓		
	Potomac Electric Power Company	DC, MD	✓	✓		
	PPL Electric Utilities Corporation	PA	✓	✓		
	Public Service Company of Colorado	CO				✓
	Public Service Company of New Hampshire	NH				✓
	Public Service Electric and Gas Company	NJ	✓	✓	✓	✓
	Rochester Gas and Electric Corporation	NY				✓
	Rockland Electric Company	NJ			✓	
	Southwestern Public Service Company	NM, TX				✓
	Union Electric Company	MO				✓
	United Illuminating Company	CT				✓
	West Penn Power Company	PA	✓	✓		
	Western Massachusetts Electric Company	MA				✓
	Wisconsin Electric Power Company	MI, WI				✓
	Wisconsin Public Service Corporation	MI, WI				✓

*** Ameren Illinois was officially created in 2010 and hence does not have data prior to 2010**

**** Black Hills Colorado Electric Utility Company, LP was created in 2008 and does not have data for 2007**

EXHIBIT P-6
Schedule MJA-2

Companies Included in Gas Comparisons

Company	LDC Group	Regional Group	New Jersey Group	ROE Proxy Group
Ameren Illinois Company - IL	✓			✓
Atlanta Gas Light Company - GA	✓			
Baltimore Gas and Electric Company - MD	✓	✓		
Berkshire Gas Company - MA				✓
Black Hills Colorado Gas Utility Company, LP - CO				✓
Black Hills Energy Arkansas, Inc. - AR				✓
Black Hills Gas Distribution LLC - WY				✓
Black Hills Iowa Gas Utility Company, LLC - IA				✓
Black Hills Kansas Gas Utility Company, LLC - KS				✓
Black Hills Nebraska Gas Utility Company LLC - NE				✓
Boston Gas Company - MA	✓			
Brooklyn Union Gas Company - NY	✓	✓		
CenterPoint Energy Resources Corp. - TX	✓			✓
CenterPoint Energy Resources Corp. - MN	✓			✓
CenterPoint Energy Resources Corp. - AR				✓
CenterPoint Energy Resources Corp. - LA				✓
CenterPoint Energy Resources Corp. - OK				✓
CenterPoint Energy Resources Corp. - TX				✓
CenterPoint Energy Resources Corp. - LA				✓
CenterPoint Energy Resources Corp. - MS				✓
Cheyenne Light, Fuel and Power Company - WY				✓
Citizens Gas Fuel Company - MI				✓
Columbia Gas of Ohio, Incorporated - OH	✓			
Connecticut Natural Gas Corporation - CT				✓
Consolidated Edison Company of New York, Inc. - NY	✓	✓		✓
Consumers Energy Company - MI	✓			✓
DTE Gas Company - MI	✓			✓
East Ohio Gas Company - OH	✓			
Equitable Gas Company, LLC - PA	✓	✓		
Indiana Gas Company, Inc. - IN	✓			
Kansas Gas Service Company - KS	✓			
KeySpan Gas East Corporation - NY	✓	✓		
Spire Missouri Inc. - MO	✓			
Maine Natural Gas - ME				✓
Michigan Gas Utilities Corporation - MI				✓
MidAmerican Energy Company - IA	✓			
Minnesota Energy Resources Corporation - MN				✓
National Fuel Gas Distribution Corporation - NY	✓	✓		
New Jersey Natural Gas Company - NJ	✓	✓	✓	
New Mexico Gas Company, Inc. - NM	✓			
New York State Electric & Gas Corporation - NY				✓
Niagara Mohawk Power Corporation - NY	✓	✓		
North Shore Gas Company - IL				✓
Northern Illinois Gas Company - IL	✓			
Northern Indiana Public Service Company - IN	✓			
Northern States Power Company - MN - ND				✓
Northern States Power Company - MN - MN				✓

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Schedule MJA-2
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Companies Included in Gas Comparisons

Company	LDC Group	Regional Group	New Jersey Group	ROE Proxy Group
Northern States Power Company - WI - MI				✓
NorthWestern Corporation - MT				✓
NSTAR Gas Company - MA				✓
Oklahoma Natural Gas Company - OK	✓			
Orange and Rockland Utilities, Inc. - NY				✓
Pacific Gas and Electric Company - CA	✓			
PECO Energy Company - PA	✓	✓		
Peoples Gas Light and Coke Company - IL	✓			✓
Philadelphia Gas Works Co. - PA	✓	✓		
Piedmont Natural Gas Company, Inc. - NC	✓			
Pivotal Utility Holdings, Inc. - NJ			✓	
Public Service Company of Colorado - CO	✓			✓
Public Service Company of North Carolina, Incorporated - NC	✓			
Public Service Electric and Gas Company - NJ	✓	✓	✓	✓
Puget Sound Energy, Inc. - WA	✓			
Questar Gas Company - UT	✓			
Rochester Gas and Electric Corporation - NY				✓
San Diego Gas & Electric Co. - CA	✓			
South Jersey Gas Company - NJ			✓	
Southern California Gas Company - CA	✓			
Southern Connecticut Gas Company - CT				✓
Southwest Gas Corporation - NV	✓			
Texas Gas Service Company - TX	✓			
Wisconsin Electric Power Company - WI				✓
Wisconsin Gas LLC - WI	✓			✓
Yankee Gas Services Company - CT				✓

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Schedule MJA-3
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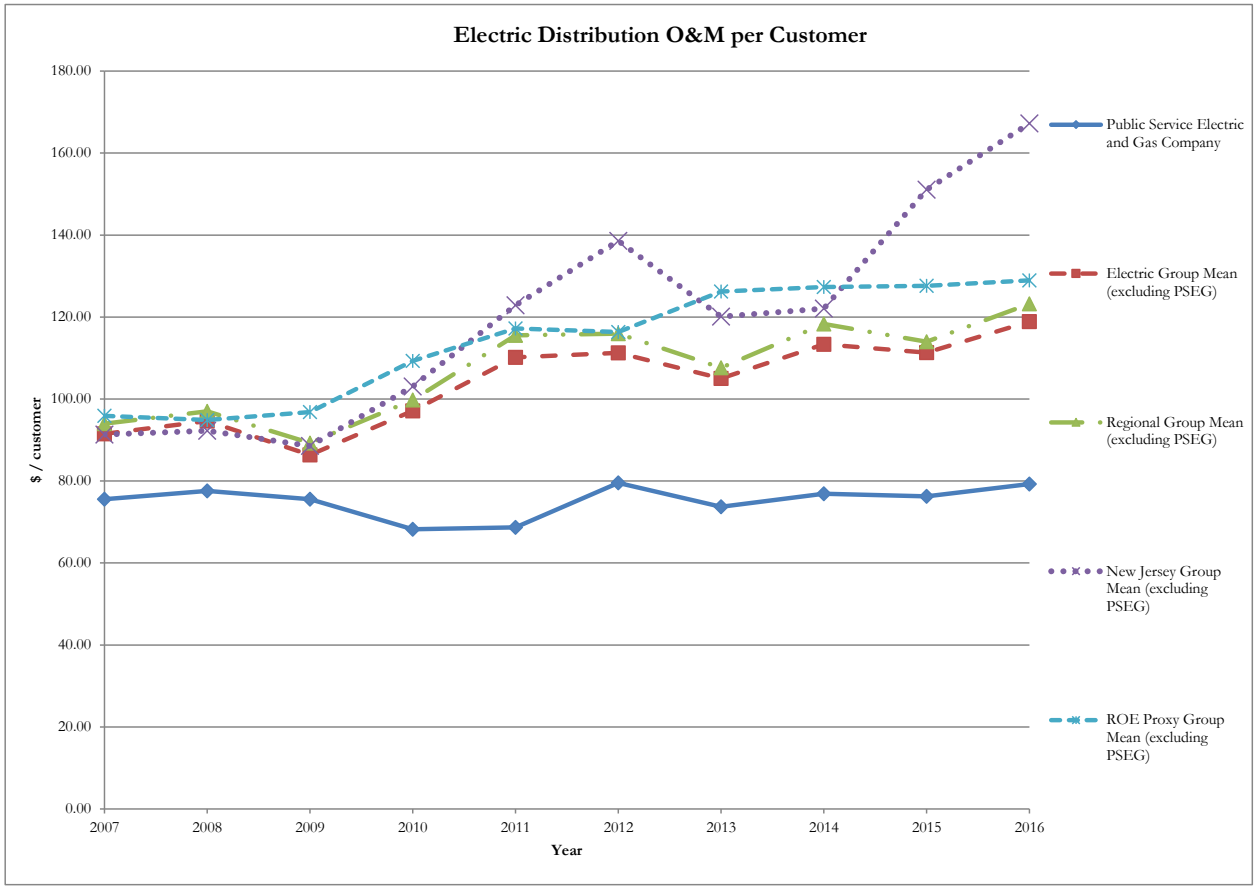

Electric Distribution O&M per Customer										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	75.55	77.58	75.54	68.23	68.66	79.53	73.70	76.89	76.25	79.27
Electric Group Mean (excluding PSEG)	91.52	94.61	86.36	97.09	110.17	111.27	105.01	113.35	111.34	118.88
Regional Group Mean (excluding PSEG)	94.02	96.98	89.28	99.78	115.52	115.95	107.62	118.33	113.99	123.21
New Jersey Group Mean (excluding PSEG)	91.32	92.25	88.54	103.04	122.85	138.58	120.08	122.08	151.05	167.24
ROE Proxy Group Mean (excluding PSEG)	95.90	94.88	96.82	109.27	117.23	116.37	126.23	127.33	127.62	128.95

EXHIBIT P-6
Schedule MJA-4
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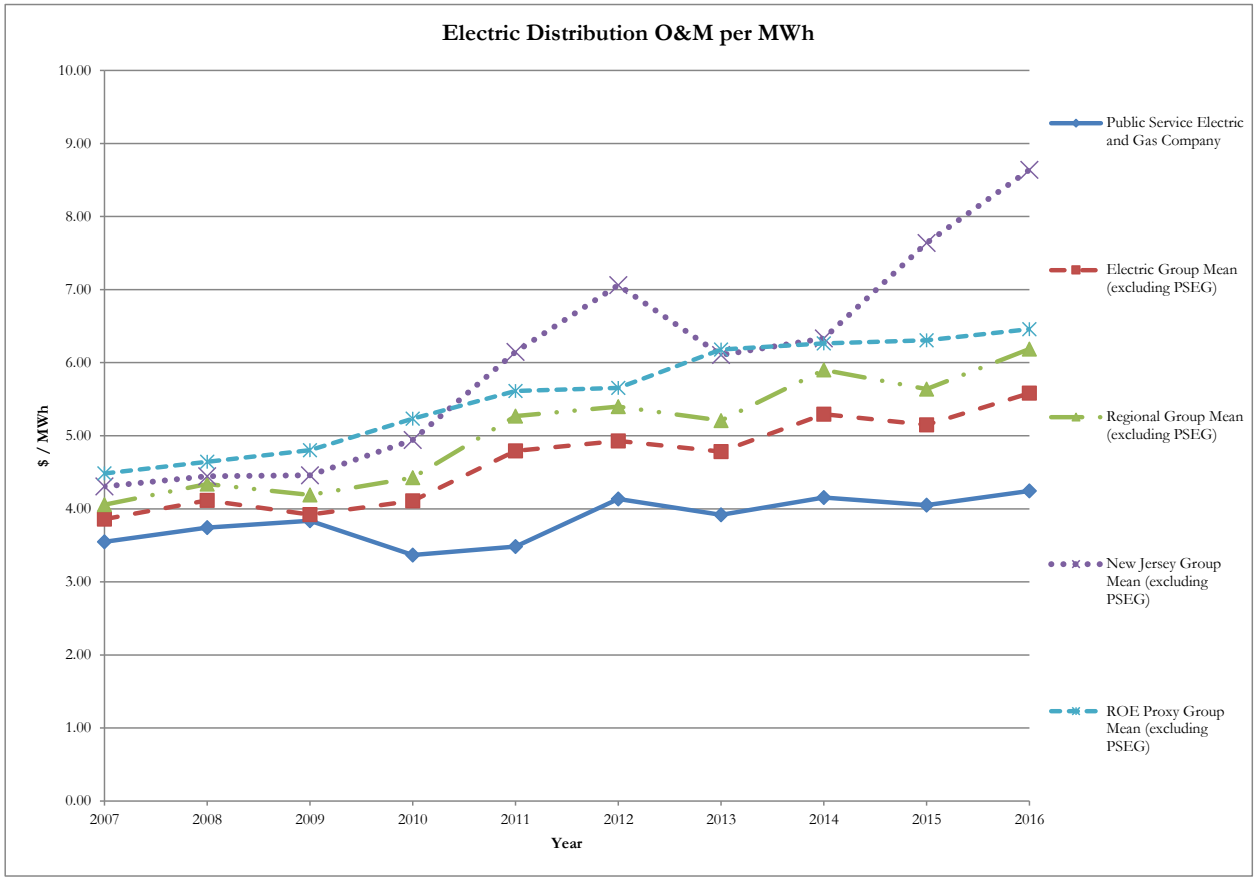

Electric Distribution O&M per MWh										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	3.55	3.74	3.84	3.37	3.48	4.13	3.92	4.15	4.05	4.24
Electric Group Mean (excluding PSEG)	3.86	4.12	3.92	4.11	4.79	4.93	4.78	5.29	5.15	5.58
Regional Group Mean (excluding PSEG)	4.06	4.34	4.19	4.43	5.27	5.40	5.21	5.90	5.64	6.19
New Jersey Group Mean (excluding PSEG)	4.31	4.44	4.46	4.94	6.15	7.06	6.10	6.33	7.64	8.64
ROE Proxy Group Mean (excluding PSEG)	4.48	4.64	4.80	5.23	5.61	5.65	6.18	6.27	6.31	6.46

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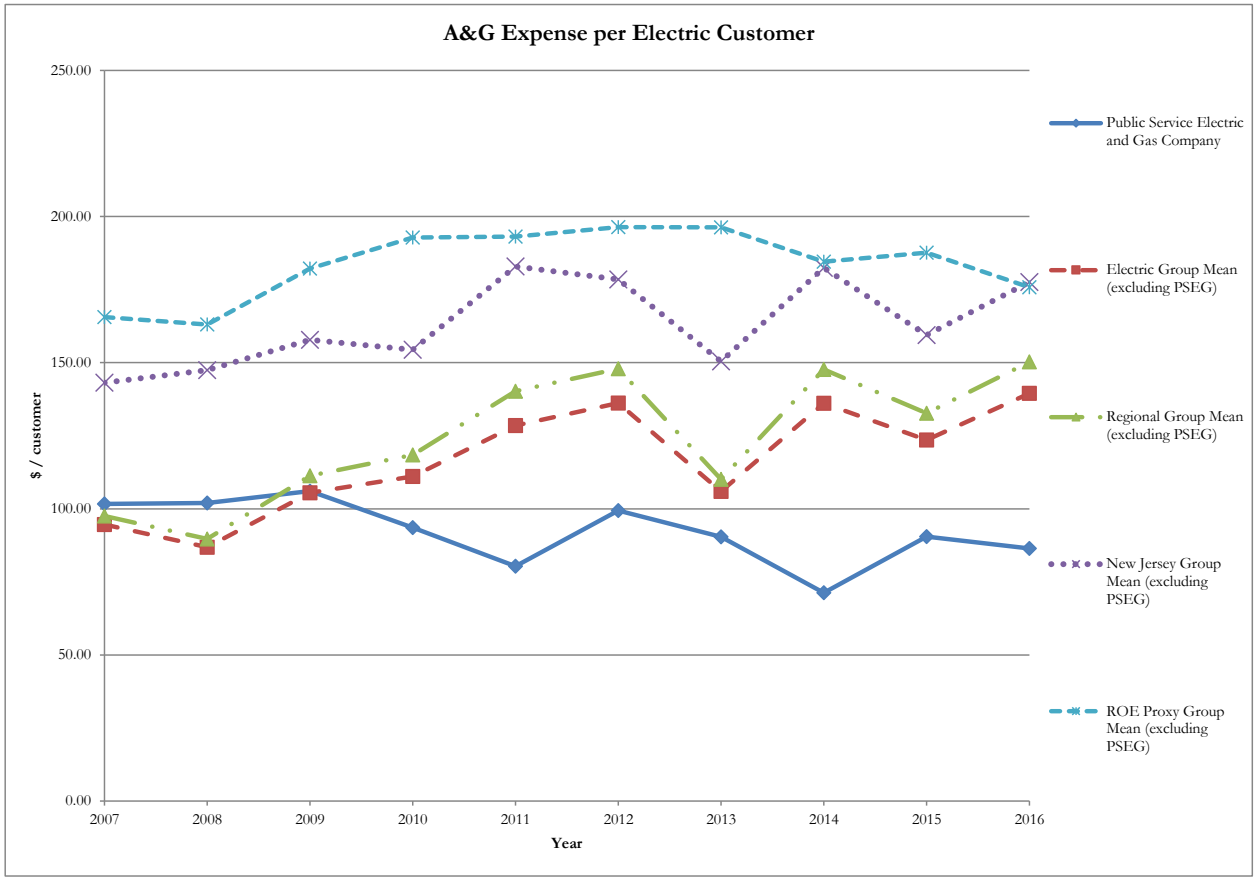

A&G Expense per Electric Customer										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	101.70	102.02	106.07	93.60	80.35	99.40	90.42	71.26	90.50	86.47
Electric Group Mean (excluding PSEG)	94.65	86.87	105.44	111.09	128.49	136.16	105.97	136.08	123.53	139.49
Regional Group Mean (excluding PSEG)	97.52	89.70	111.30	118.46	140.20	147.95	110.13	147.69	132.73	150.25
New Jersey Group Mean (excluding PSEG)	143.14	147.43	157.79	154.45	182.91	178.47	150.48	182.41	159.46	177.55
ROE Proxy Group Mean (excluding PSEG)	165.59	163.05	182.23	192.79	193.19	196.38	196.31	184.59	187.66	175.77

EXHIBIT P-6
Schedule MJA-6
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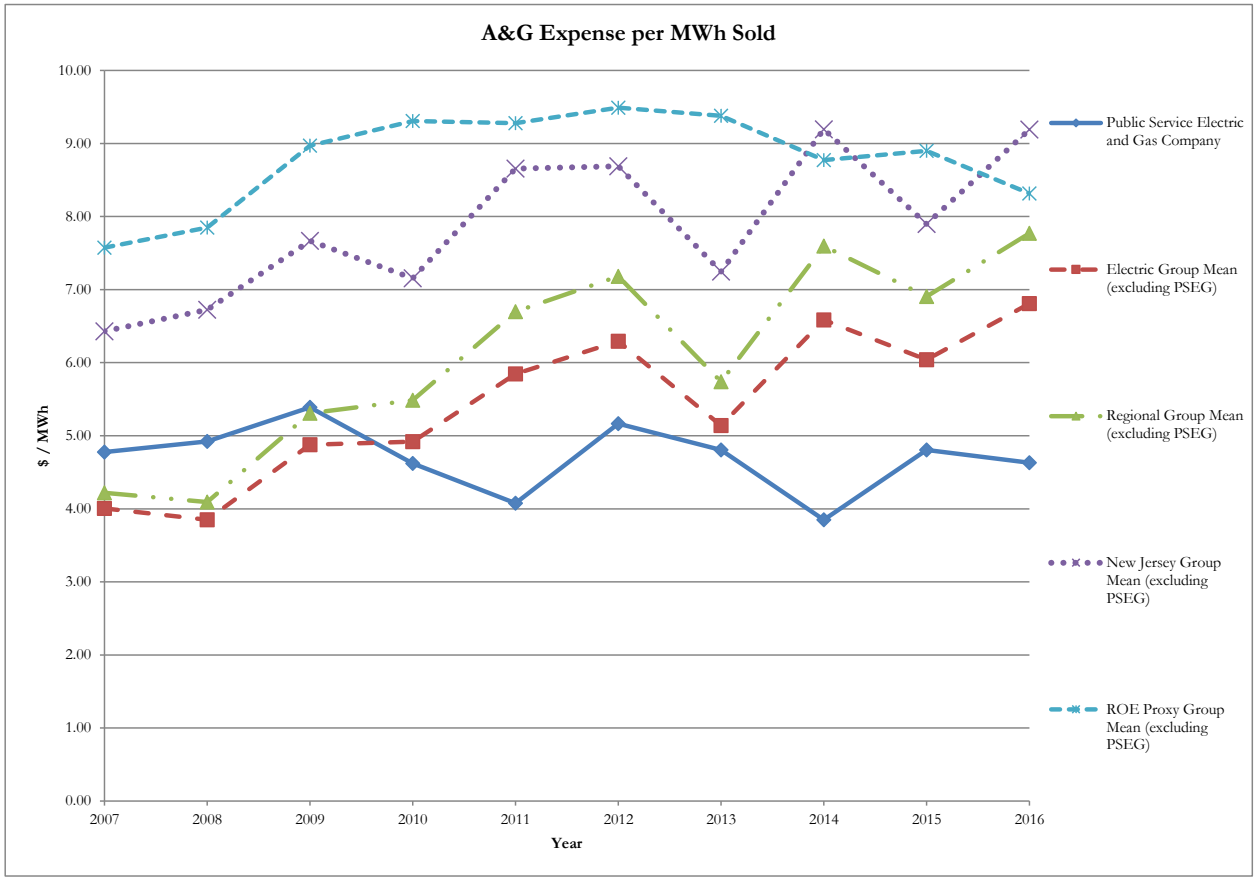

A&G Expense per MWh Sold										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	4.78	4.92	5.39	4.62	4.08	5.17	4.81	3.85	4.81	4.63
Electric Group Mean (excluding PSEG)	4.00	3.85	4.88	4.92	5.85	6.29	5.14	6.58	6.04	6.81
Regional Group Mean (excluding PSEG)	4.22	4.09	5.31	5.49	6.70	7.18	5.74	7.60	6.91	7.77
New Jersey Group Mean (excluding PSEG)	6.43	6.72	7.67	7.15	8.66	8.69	7.25	9.20	7.90	9.19
ROE Proxy Group Mean (excluding PSEG)	7.57	7.85	8.97	9.31	9.28	9.49	9.38	8.77	8.90	8.32

EXHIBIT P-6
Schedule MJA-7
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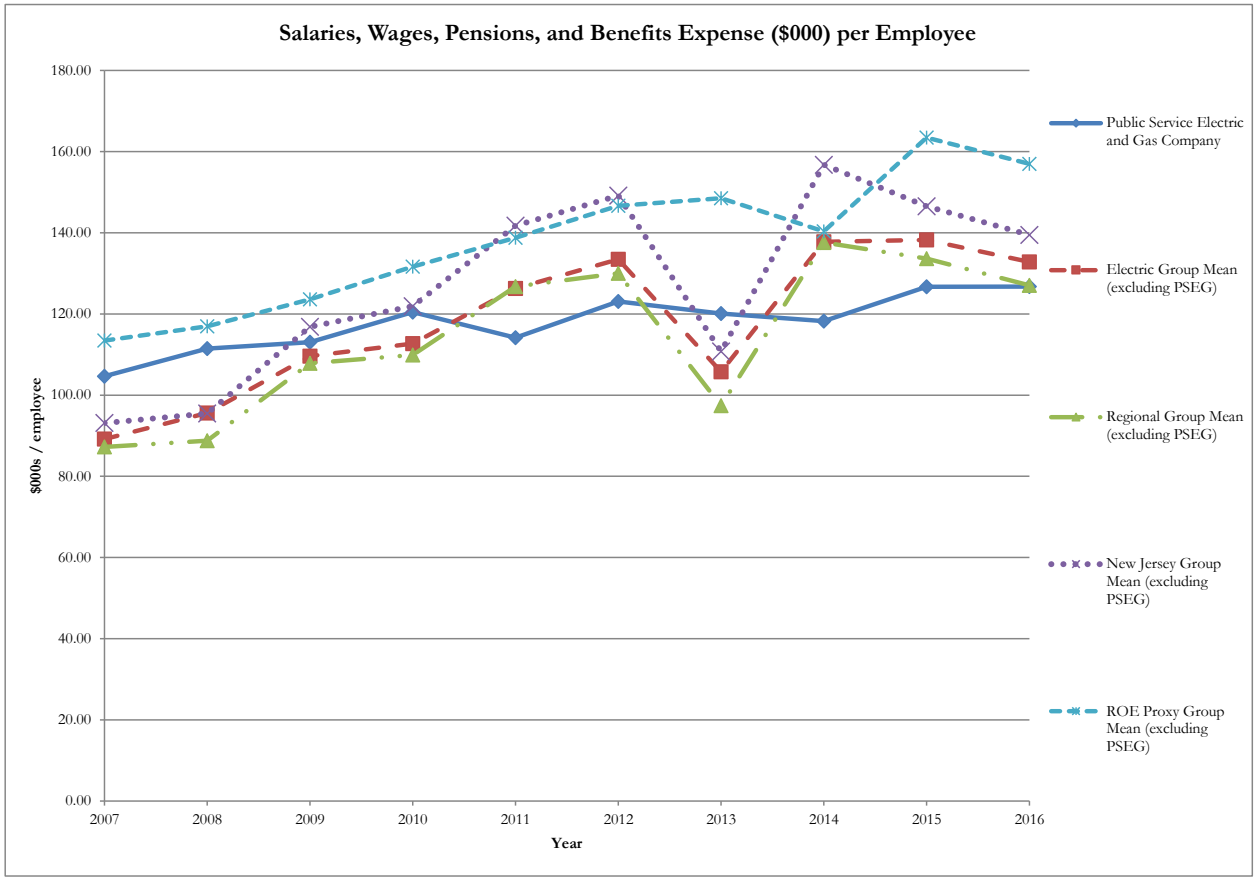

Salaries, Wages, Pensions, and Benefits Expense ($000) per Employee										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	104.66	111.47	113.03	120.44	114.16	123.07	120.12	118.26	126.71	126.74
Electric Group Mean (excluding PSEG)	89.17	95.60	109.59	112.71	126.30	133.49	105.76	137.77	138.24	132.80
Regional Group Mean (excluding PSEG)	87.24	88.79	107.88	109.92	126.74	130.02	97.43	137.62	133.64	127.07
New Jersey Group Mean (excluding PSEG)	93.13	95.47	116.85	121.93	141.75	149.16	110.76	156.76	146.54	139.46
ROE Proxy Group Mean (excluding PSEG)	113.44	116.96	123.63	131.65	138.79	146.64	148.52	140.33	163.45	156.97

EXHIBIT P-6
Schedule MJA-8
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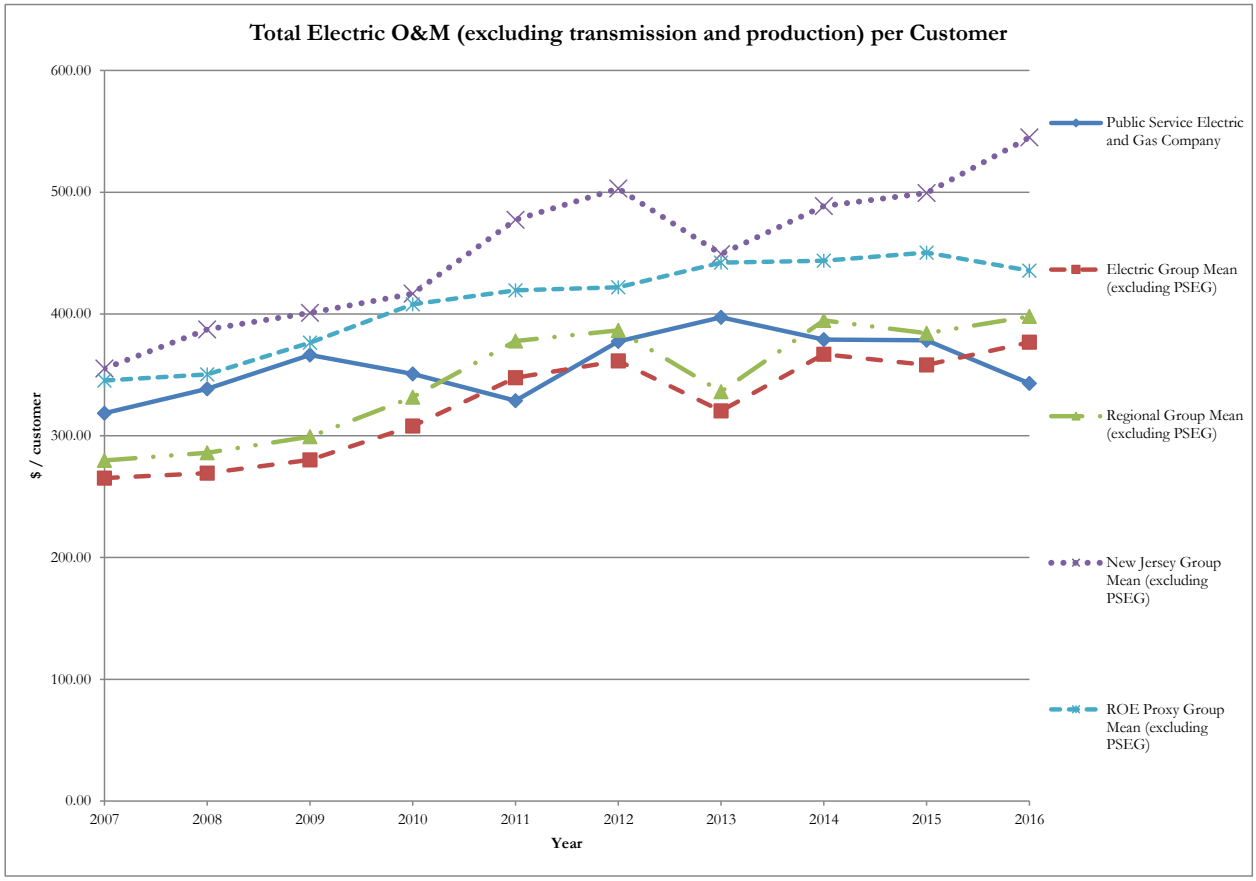

Total Electric O&M (excluding transmission and production) per Customer										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	318.53	338.54	366.38	350.71	328.83	377.36	397.25	378.98	378.28	343.01
Electric Group Mean (excluding PSEG)	265.26	269.21	280.18	307.96	347.56	361.47	320.48	366.90	358.16	376.76
Regional Group Mean (excluding PSEG)	279.71	286.06	299.25	331.69	377.78	386.57	336.12	394.66	384.15	397.97
New Jersey Group Mean (excluding PSEG)	355.23	387.26	400.95	416.59	477.45	502.97	449.11	488.64	499.38	544.98
ROE Proxy Group Mean (excluding PSEG)	345.36	350.41	376.45	407.96	419.49	421.97	442.22	443.78	450.42	435.46

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Schedule MJA-9
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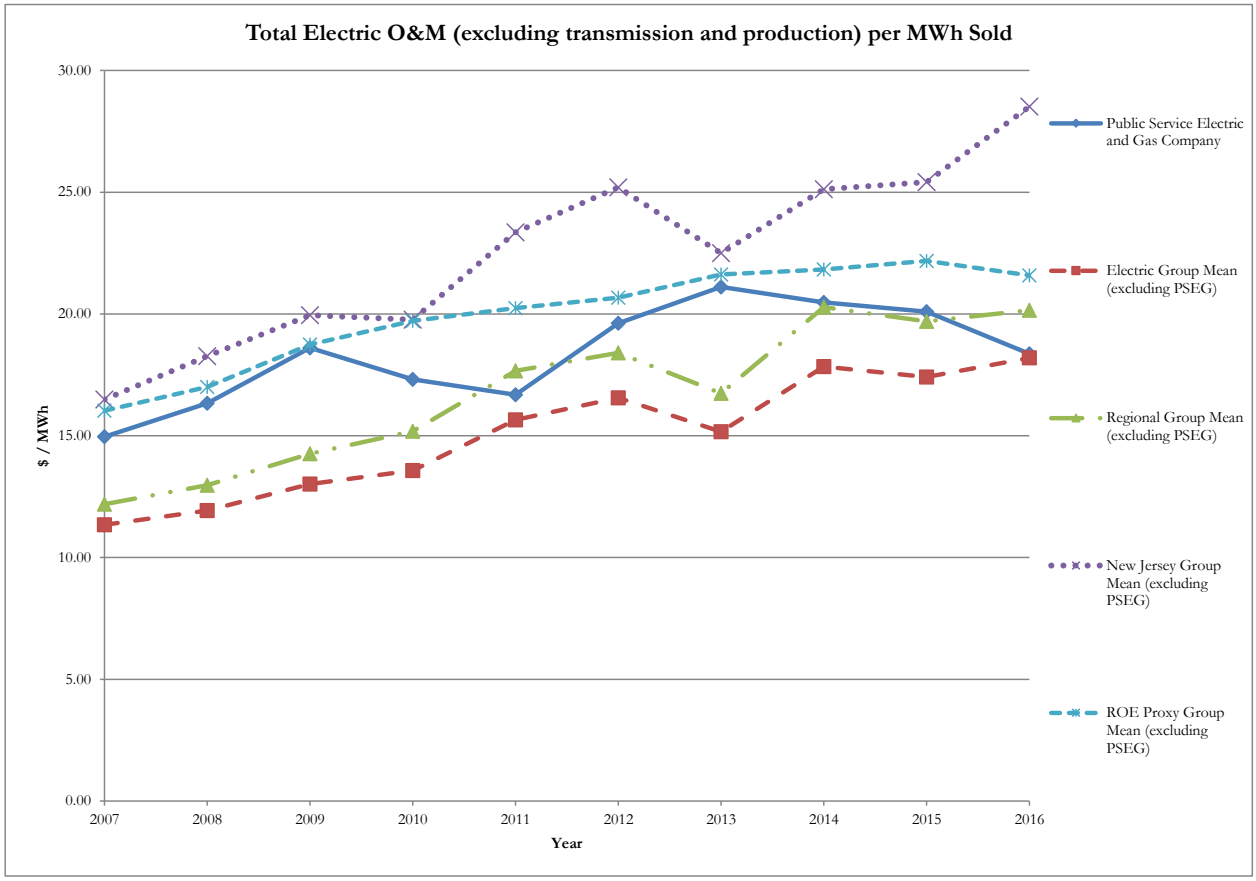

Total Electric O&M (excluding transmission and production) per MWh Sold										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	14.96	16.33	18.61	17.31	16.68	19.62	21.11	20.47	20.09	18.37
Electric Group Mean (excluding PSEG)	11.34	11.93	13.02	13.58	15.65	16.56	15.16	17.84	17.41	18.20
Regional Group Mean (excluding PSEG)	12.19	12.97	14.26	15.19	17.66	18.41	16.74	20.28	19.70	20.15
New Jersey Group Mean (excluding PSEG)	16.49	18.27	19.95	19.77	23.35	25.20	22.50	25.12	25.42	28.51
ROE Proxy Group Mean (excluding PSEG)	16.03	17.01	18.74	19.72	20.24	20.66	21.62	21.82	22.18	21.59

EXHIBIT P-6
Schedule MJA-10
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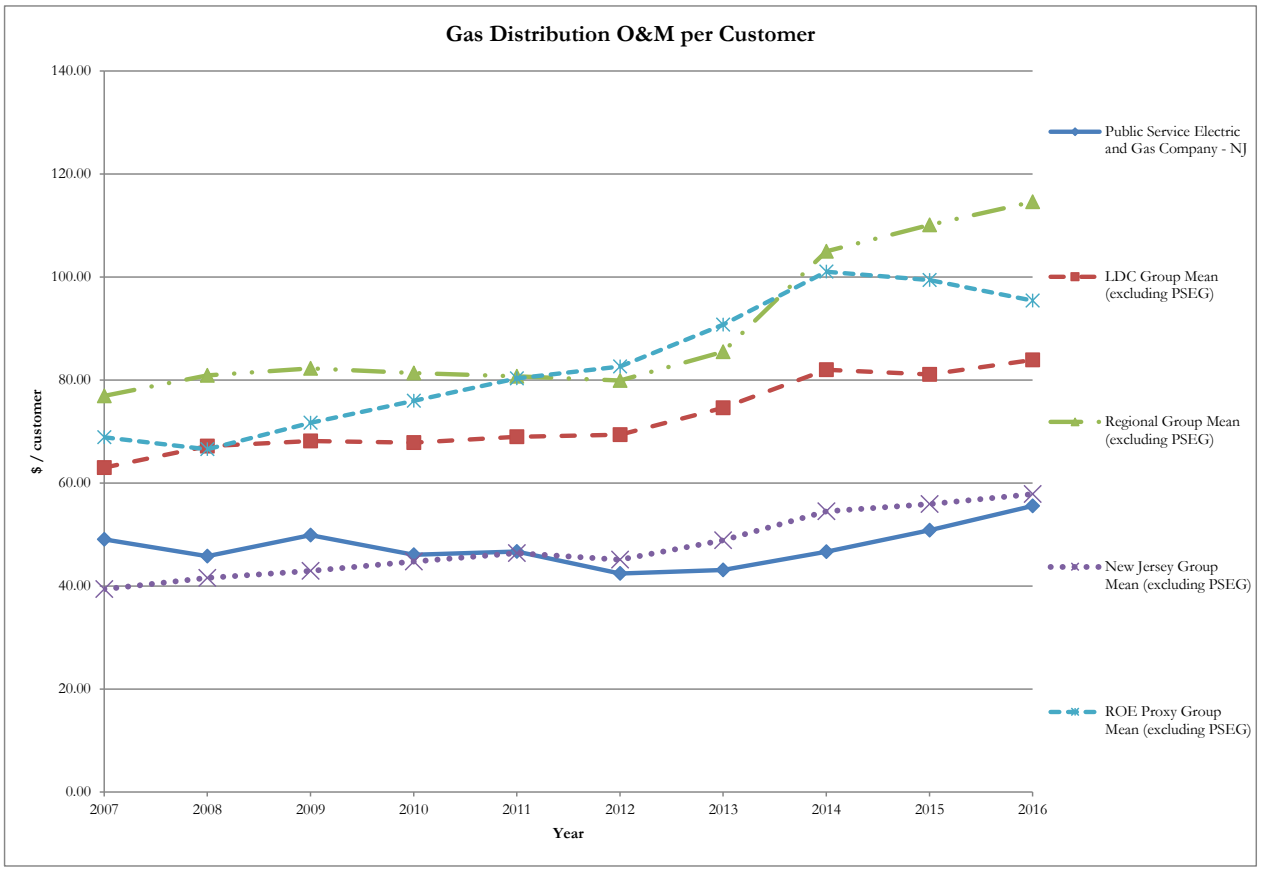

Gas Distribution O&M per Customer										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company - NJ	49.07	45.78	49.89	46.05	46.69	42.42	43.12	46.65	50.80	55.55
LDC Group Mean (excluding PSEG)	62.99	67.16	68.17	67.82	68.95	69.38	74.59	81.98	81.07	83.89
Regional Group Mean (excluding PSEG)	76.91	80.90	82.25	81.36	80.72	79.88	85.50	104.97	110.10	114.59
New Jersey Group Mean (excluding PSEG)	39.38	41.59	42.92	44.73	46.38	45.10	48.86	54.51	55.91	57.84
ROE Proxy Group Mean (excluding PSEG)	68.86	66.55	71.70	75.93	80.31	82.62	90.75	101.02	99.41	95.40

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Schedule MJA-11
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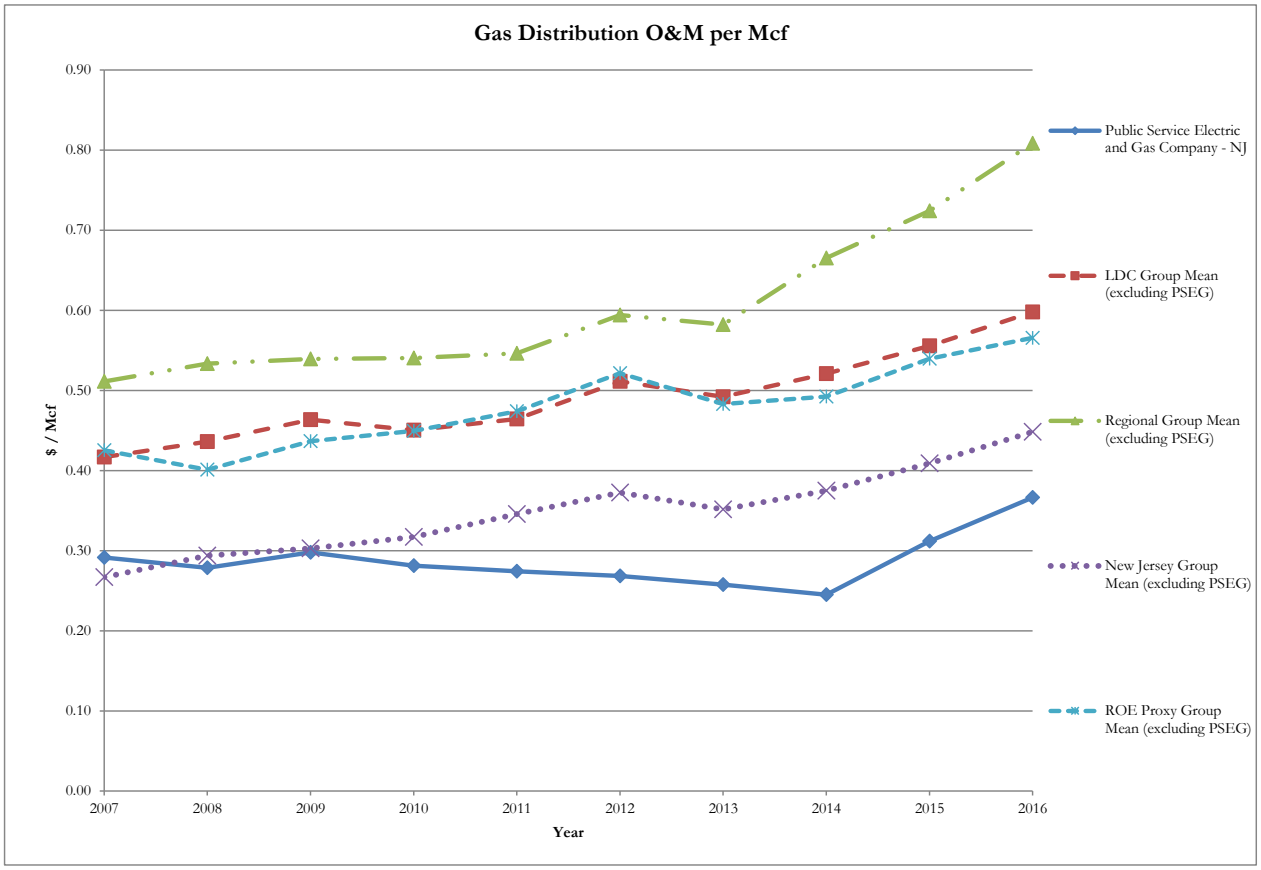

Gas Distribution O&M per Mcf										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company - NJ	0.29	0.28	0.30	0.28	0.27	0.27	0.26	0.25	0.31	0.37
LDC Group Mean (excluding PSEG)	0.42	0.44	0.46	0.45	0.46	0.51	0.49	0.52	0.56	0.60
Regional Group Mean (excluding PSEG)	0.51	0.53	0.54	0.54	0.55	0.59	0.58	0.67	0.72	0.81
New Jersey Group Mean (excluding PSEG)	0.27	0.29	0.30	0.32	0.35	0.37	0.35	0.37	0.41	0.45
ROE Proxy Group Mean (excluding PSEG)	0.43	0.40	0.44	0.45	0.47	0.52	0.48	0.49	0.54	0.57

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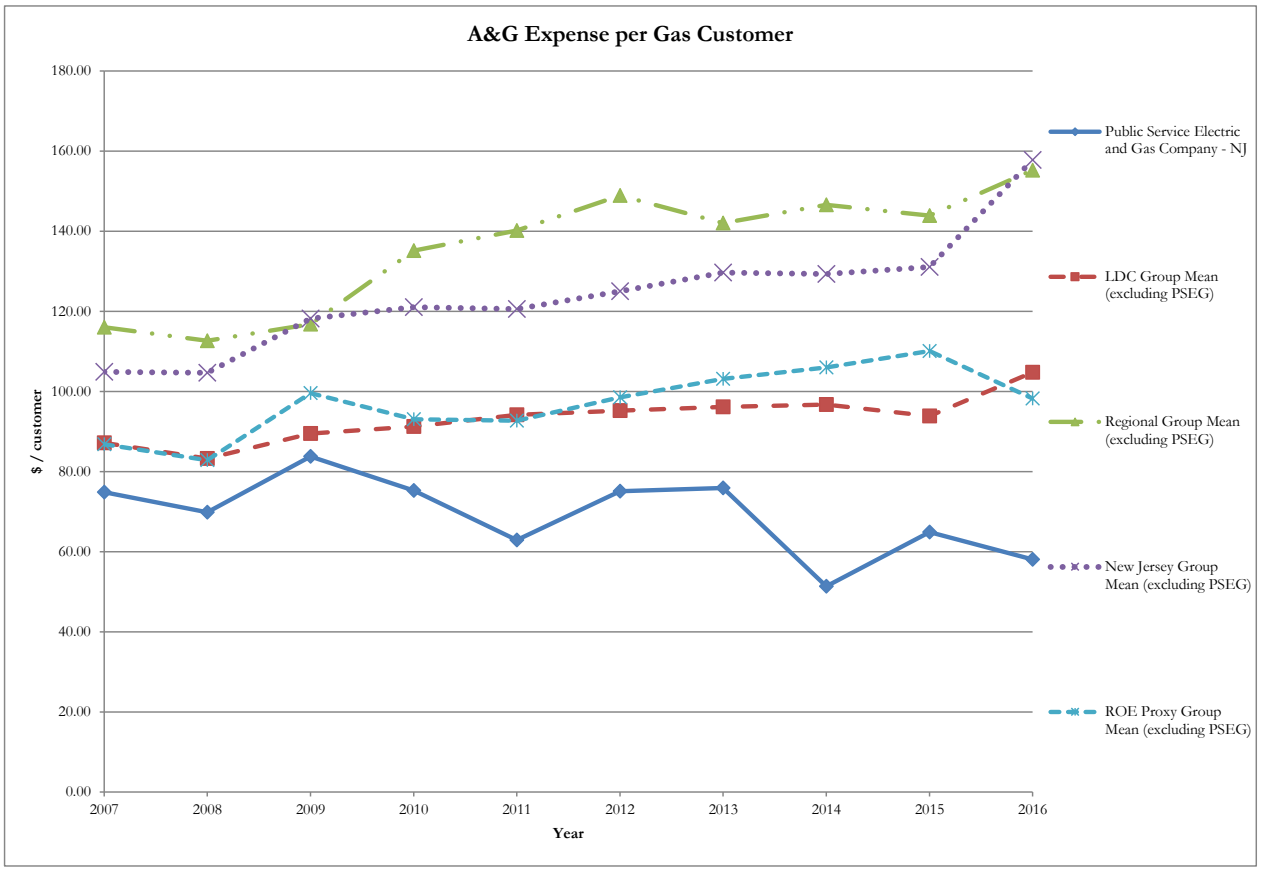

A&G Expense per Gas Customer										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company - NJ	74.87	69.81	83.75	75.25	62.89	75.06	75.90	51.35	64.88	58.05
LDC Group Mean (excluding PSEG)	87.14	83.25	89.48	91.26	94.17	95.18	96.14	96.71	93.89	104.77
Regional Group Mean (excluding PSEG)	116.05	112.66	116.78	135.16	140.15	148.94	142.05	146.58	143.92	155.24
New Jersey Group Mean (excluding PSEG)	104.87	104.65	118.21	121.05	120.59	125.02	129.65	129.30	131.05	157.80
ROE Proxy Group Mean (excluding PSEG)	86.82	82.83	99.59	93.03	92.68	98.50	103.11	106.02	110.09	98.26

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Schedule MJA-13
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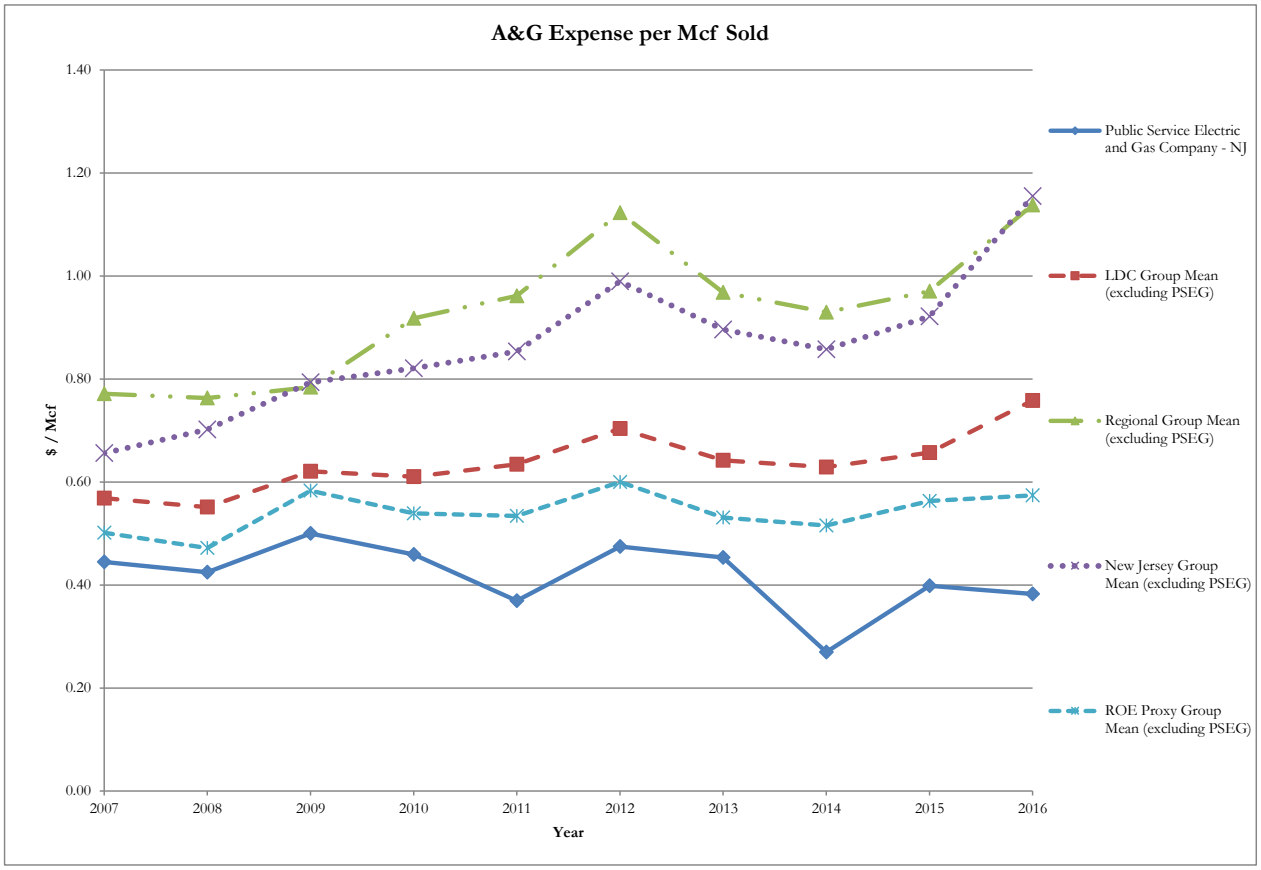

A&G Expense per Mcf Sold										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company - NJ	0.44	0.42	0.50	0.46	0.37	0.47	0.45	0.27	0.40	0.38
LDC Group Mean (excluding PSEG)	0.57	0.55	0.62	0.61	0.63	0.70	0.64	0.63	0.66	0.76
Regional Group Mean (excluding PSEG)	0.77	0.76	0.78	0.92	0.96	1.12	0.97	0.93	0.97	1.14
New Jersey Group Mean (excluding PSEG)	0.66	0.70	0.79	0.82	0.85	0.99	0.90	0.86	0.92	1.15
ROE Proxy Group Mean (excluding PSEG)	0.50	0.47	0.58	0.54	0.53	0.60	0.53	0.52	0.56	0.57

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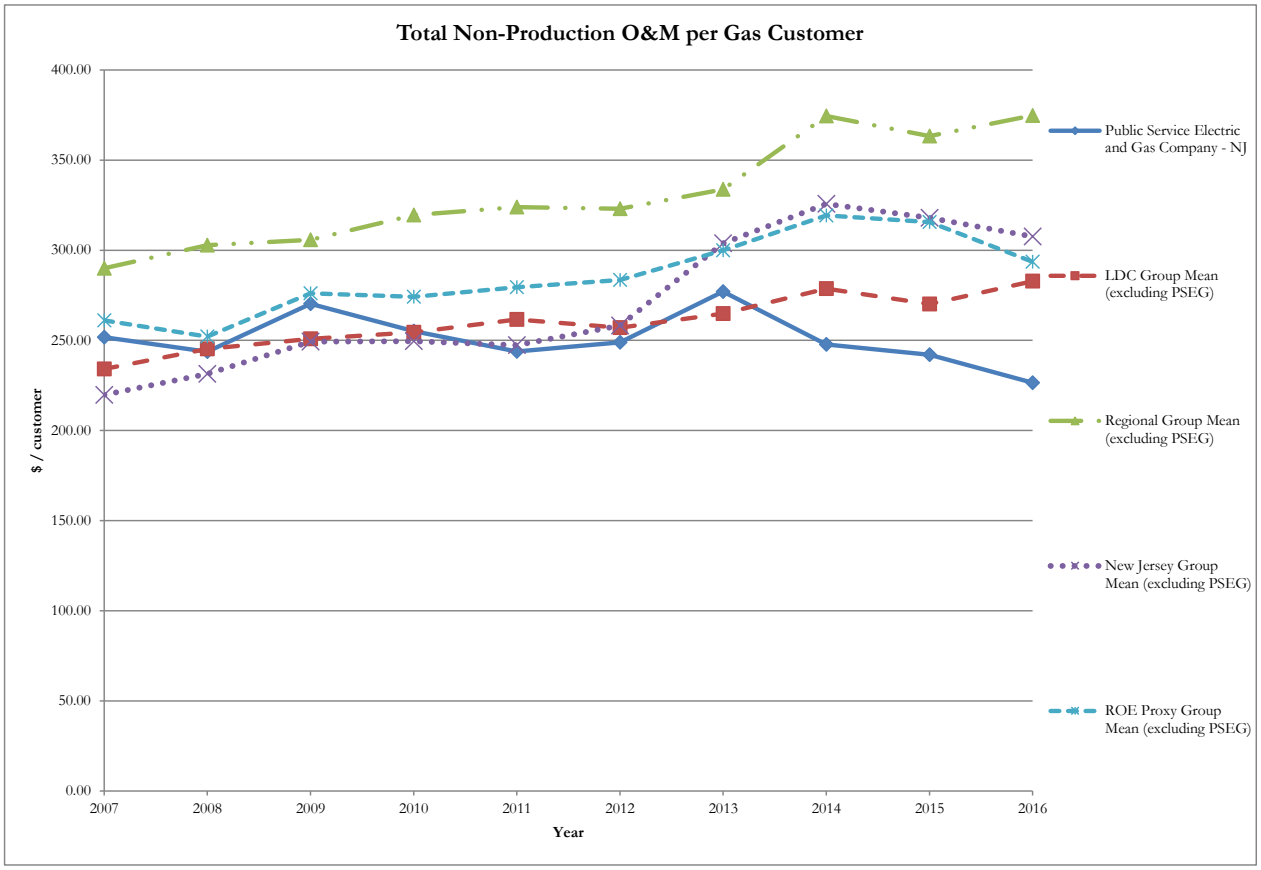

Total Non-Production O&M per Gas Customer										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company - NJ	251.78	243.77	270.27	255.17	243.84	248.92	277.07	247.70	242.08	226.50
LDC Group Mean (excluding PSEG)	234.13	245.29	250.80	254.40	261.60	257.04	264.84	278.72	270.14	282.81
Regional Group Mean (excluding PSEG)	289.99	302.84	305.80	319.54	323.93	323.01	333.80	374.46	363.34	374.79
New Jersey Group Mean (excluding PSEG)	219.79	231.38	249.25	249.50	247.29	258.28	303.89	325.70	318.02	307.58
ROE Proxy Group Mean (excluding PSEG)	261.08	252.09	276.16	274.17	279.51	283.46	299.97	319.32	315.69	293.61

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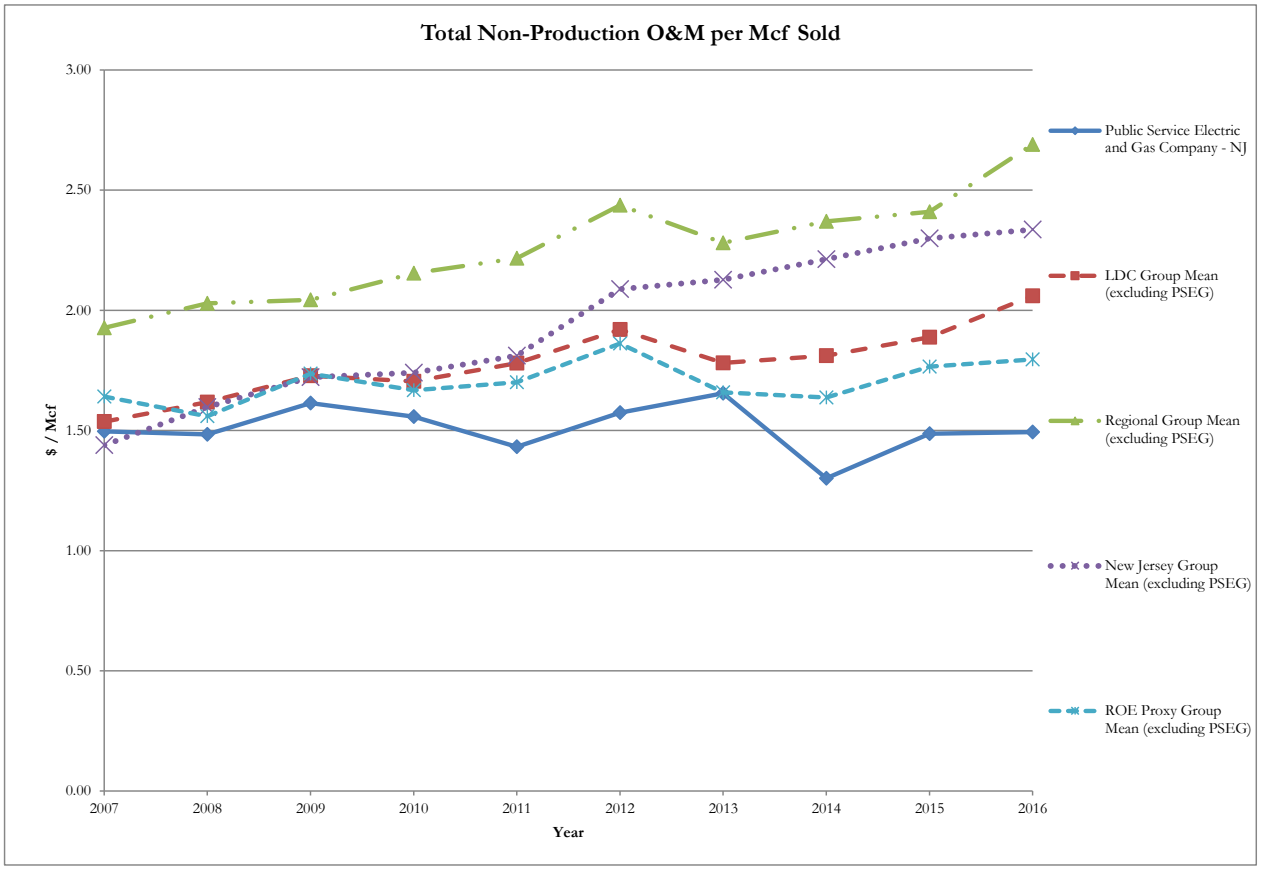

Total Non-Production O&M per Mcf Sold										
Annual Values										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company - NJ	1.50	1.48	1.61	1.56	1.43	1.57	1.65	1.30	1.49	1.49
LDC Group Mean (excluding PSEG)	1.54	1.62	1.73	1.70	1.78	1.92	1.78	1.81	1.89	2.06
Regional Group Mean (excluding PSEG)	1.93	2.03	2.04	2.15	2.22	2.44	2.28	2.37	2.41	2.69
New Jersey Group Mean (excluding PSEG)	1.44	1.60	1.72	1.74	1.81	2.09	2.13	2.21	2.30	2.34
ROE Proxy Group Mean (excluding PSEG)	1.64	1.56	1.74	1.67	1.70	1.86	1.66	1.64	1.77	1.80

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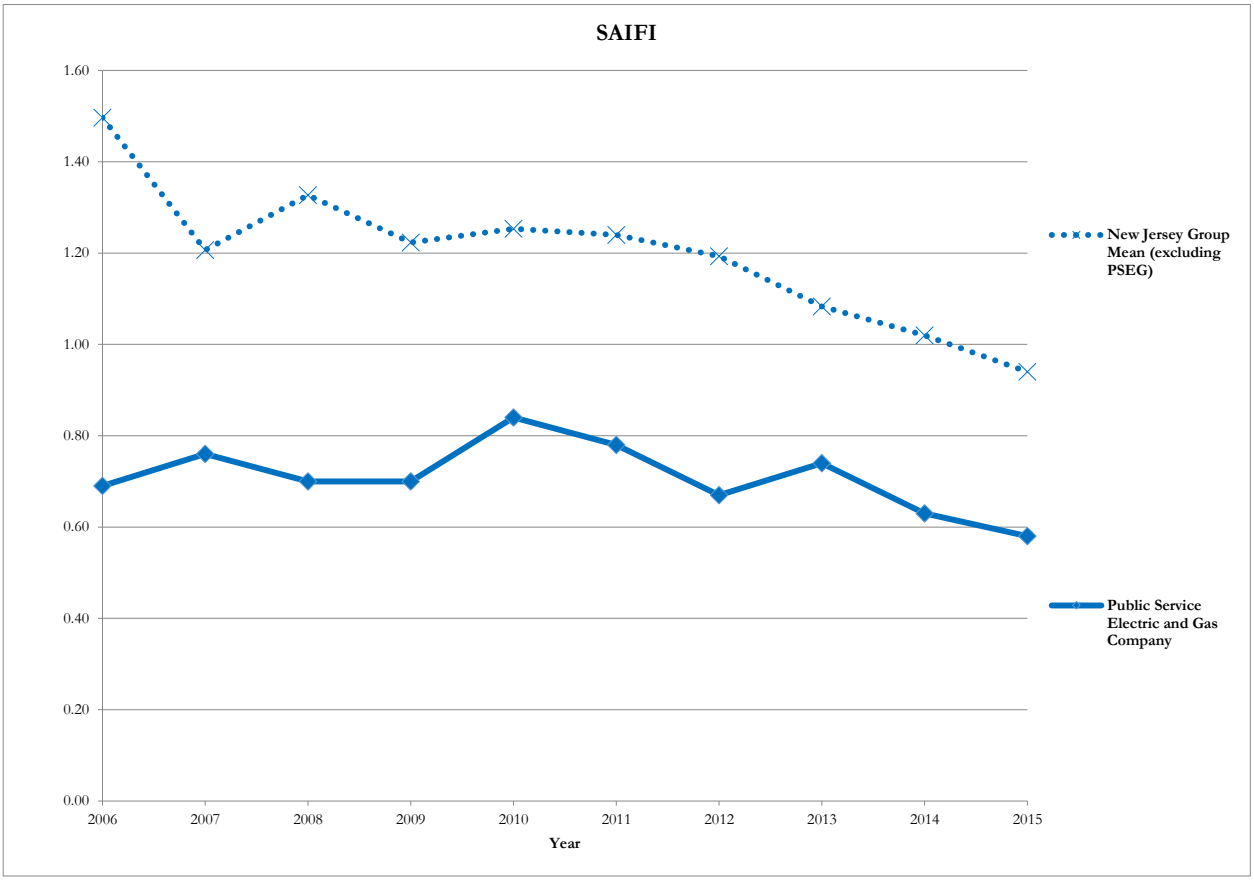

SAIFI										
Annual Values										
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Public Service Electric and Gas Company	0.69	0.76	0.70	0.70	0.84	0.78	0.67	0.74	0.63	0.58
New Jersey Group Mean (excluding PSEG)	1.50	1.21	1.33	1.22	1.25	1.24	1.19	1.08	1.02	0.94

Source: Annual System Performance Reports filed with NJ BPU

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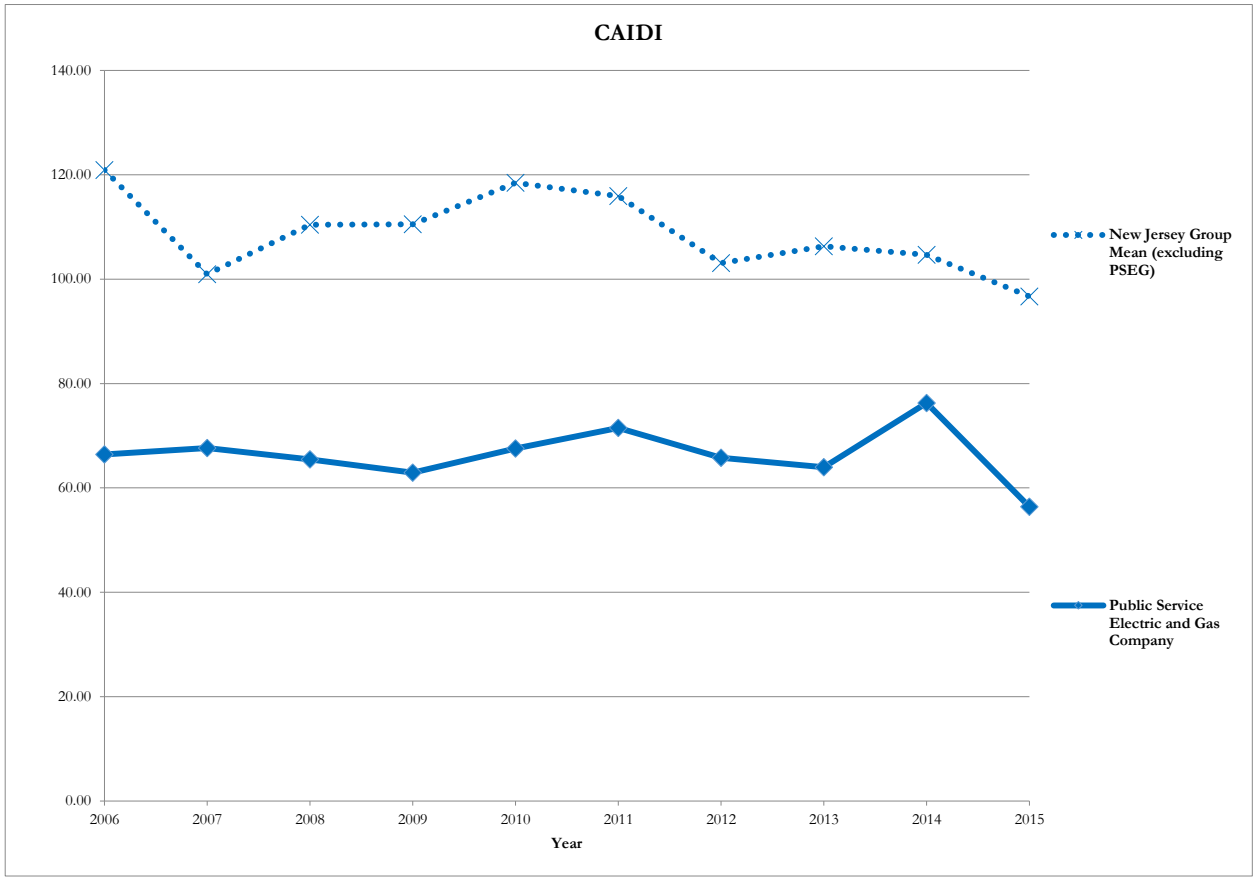

CAIDI										
Annual Values										
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Public Service Electric and Gas Company	66.44	67.65	65.45	62.92	67.54	71.49	65.77	63.97	76.28	56.39
New Jersey Group Mean (excluding PSEG)	120.93	100.93	110.43	110.53	118.47	115.93	103.10	106.30	104.67	96.70

Source: Annual System Performance Reports filed with NJ BPU

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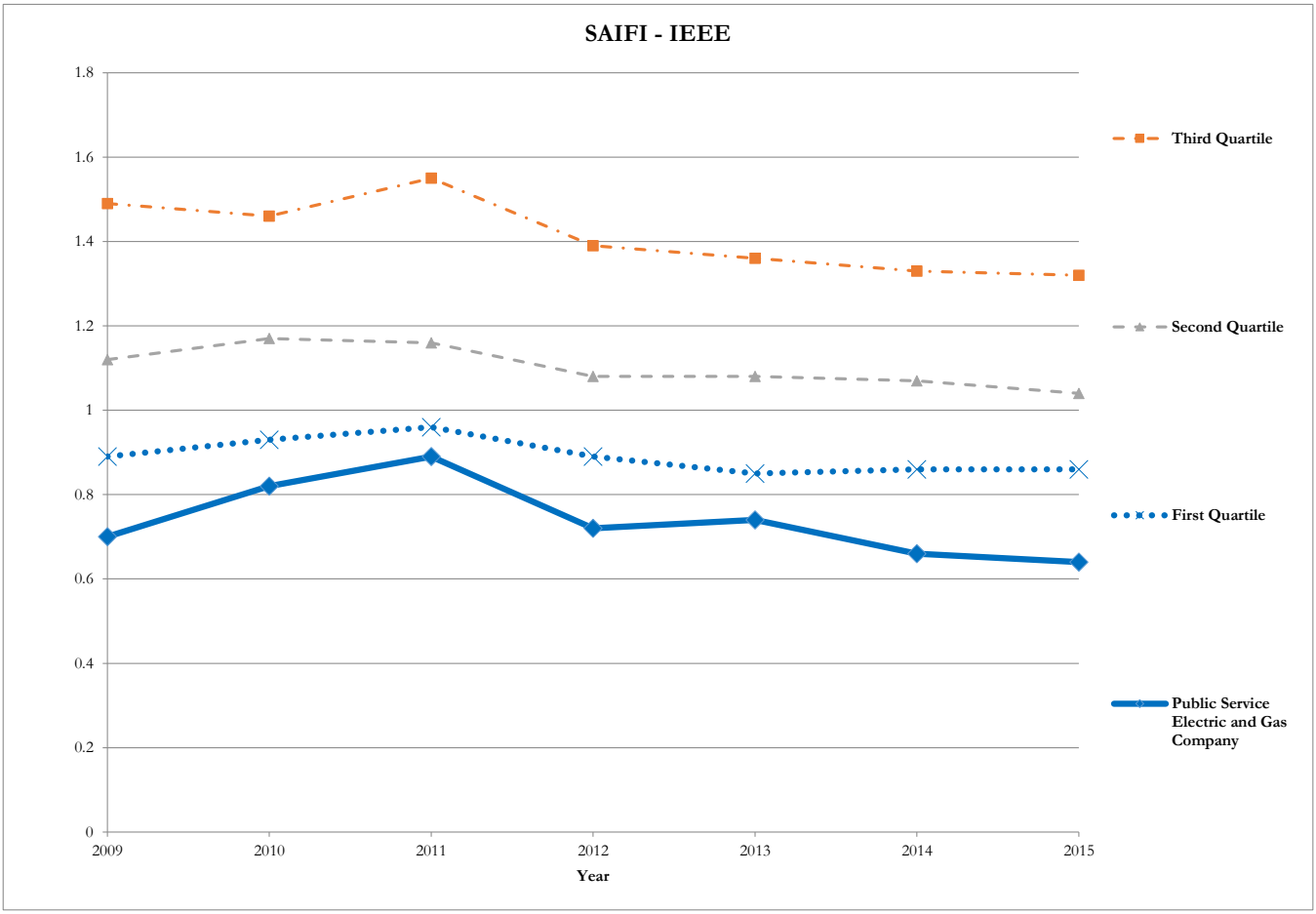

SAIFI - IEEE							
Annual Values							
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Public Service Electric and Gas Company	0.70	0.82	0.89	0.72	0.74	0.66	0.64
Third Quartile	1.49	1.46	1.55	1.39	1.36	1.33	1.32
Second Quartile	1.12	1.17	1.16	1.08	1.08	1.07	1.04
First Quartile	0.89	0.93	0.96	0.89	0.85	0.86	0.86

Source: IEEE

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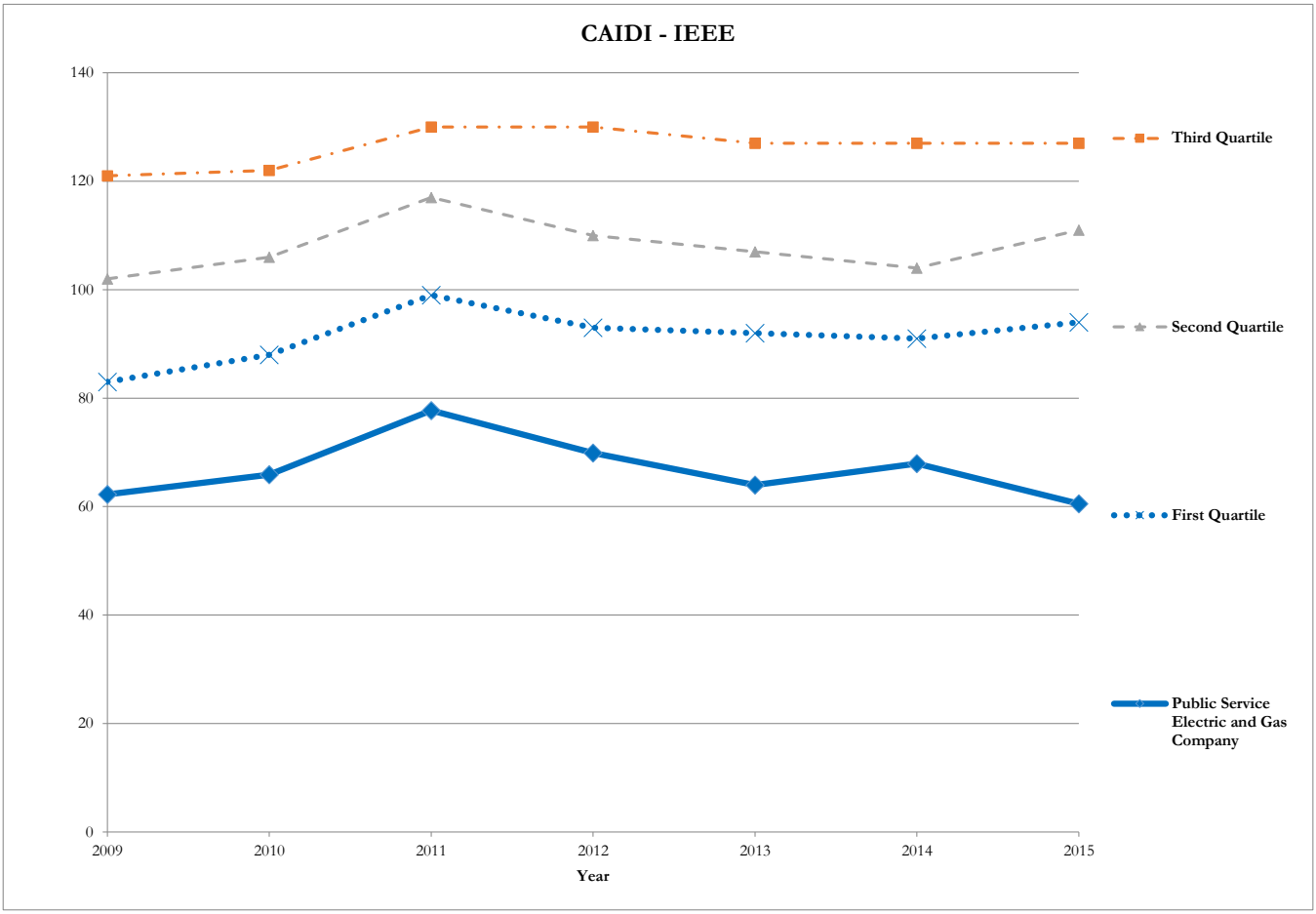

CAIDI - IEEE							
Annual Values							
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Public Service Electric and Gas Company	62	66	78	70	64	68	61
Third Quartile	121	122	130	130	127	127	127
Second Quartile	102	106	117	110	107	104	111
First Quartile	83	88	99	93	92	91	94

Source: IEEE

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Schedule MJA-20
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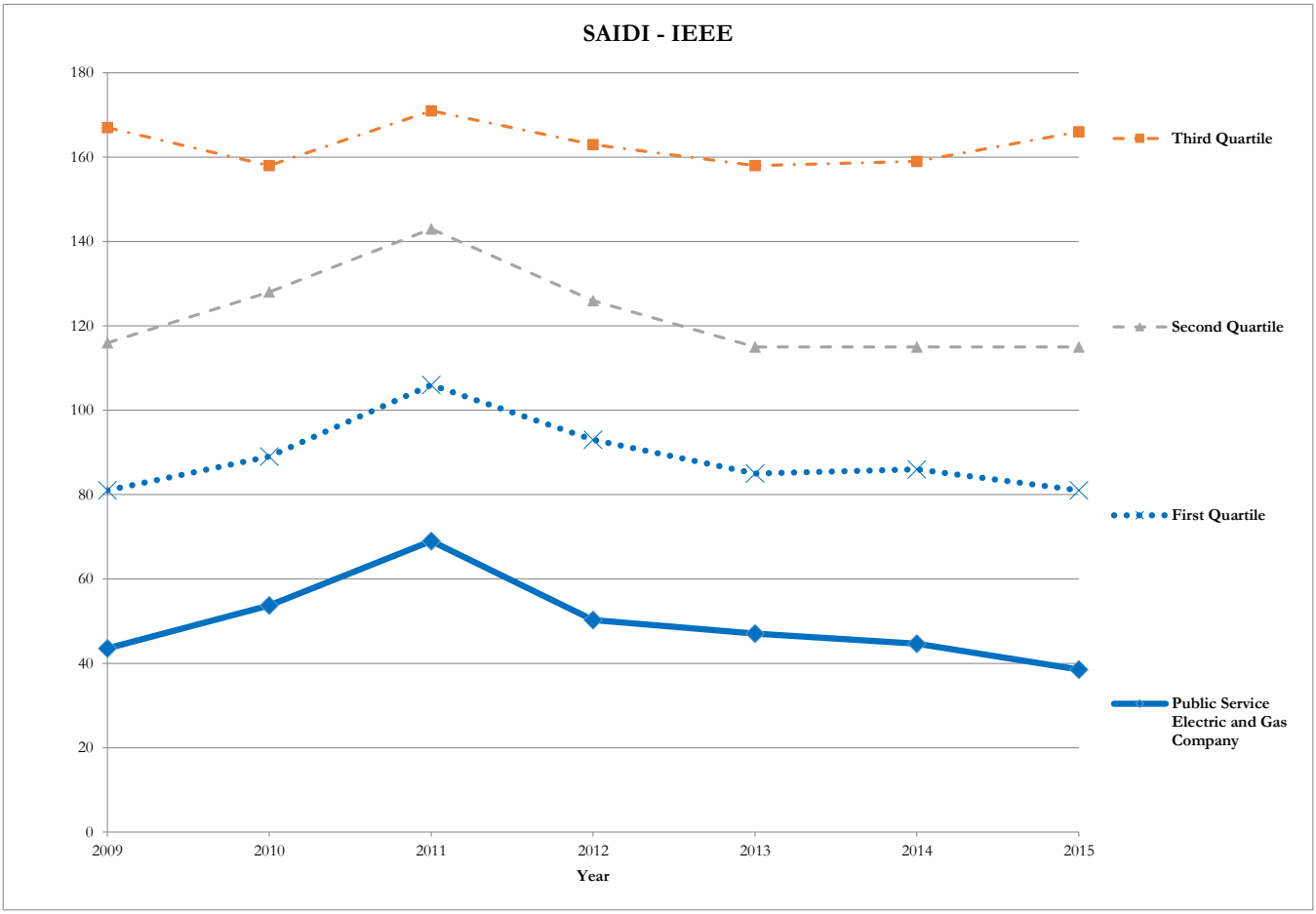

SAIDI - IEEE							
Annual Values							
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Public Service Electric and Gas Company	44	54	69	50	47	45	39
Third Quartile	167	158	171	163	158	159	166
Second Quartile	116	128	143	126	115	115	115
First Quartile	81	89	106	93	85	86	81

Source: IEEE

EXHIBIT P-6
Schedule MJA-21
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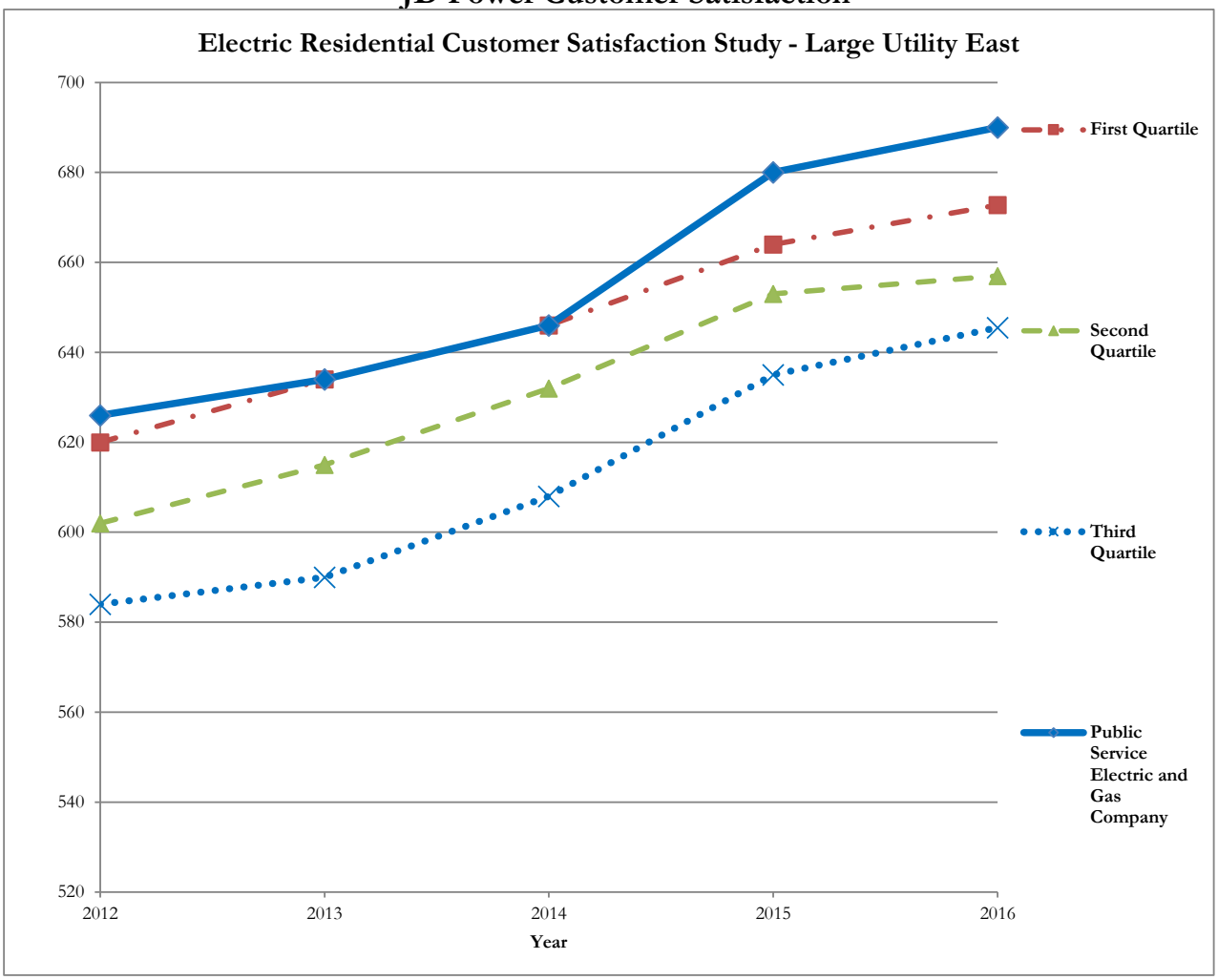
JD Power Customer Satisfaction



Electric Residential Customer Satisfaction Study - Large Utility East					
Annual Values					
	2012	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	626	634	646	680	690
First Quartile	620	634	646	664	673
Second Quartile	602	615	632	653	657
Third Quartile	584	590	608	635	646

Source: JD Power

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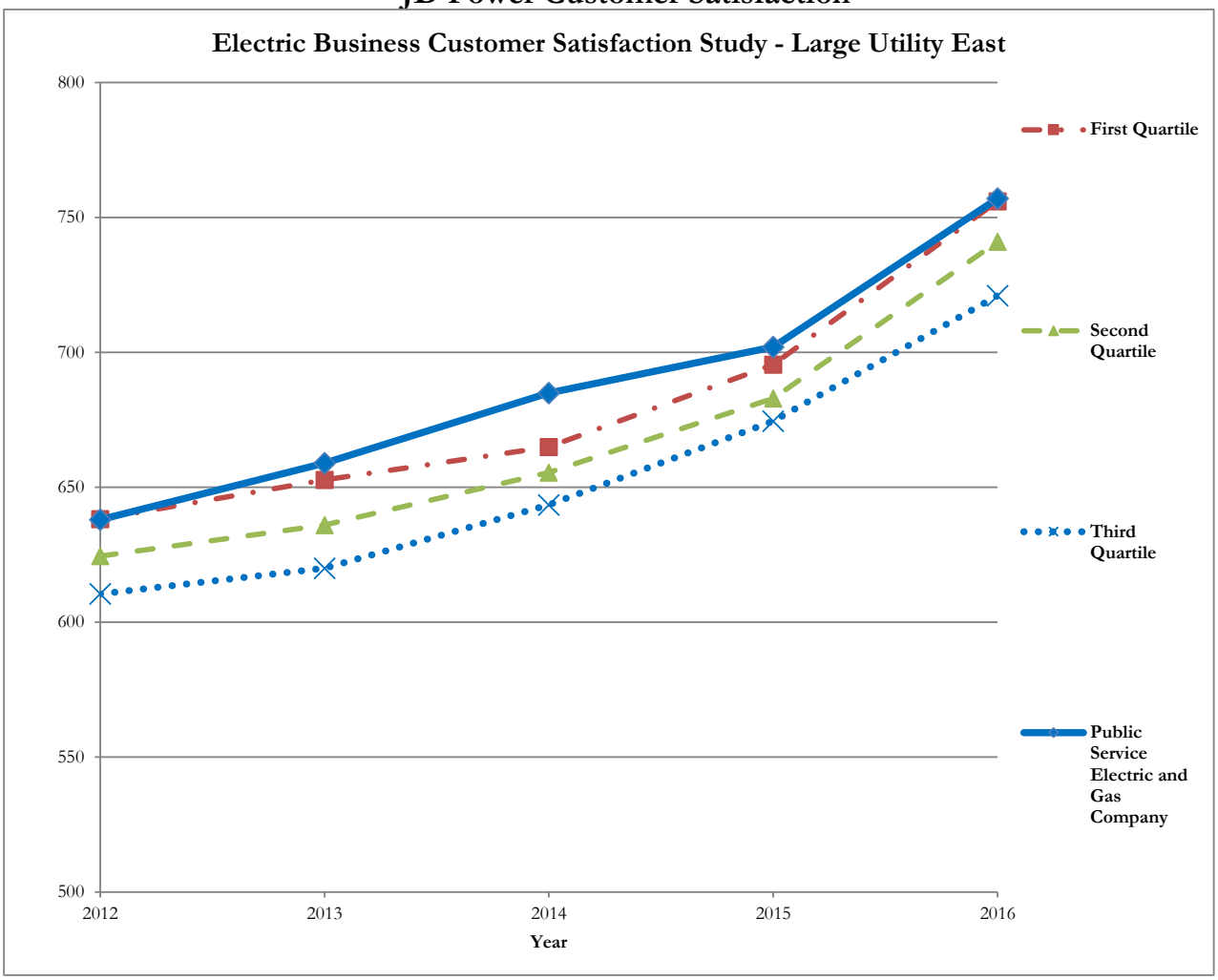
JD Power Customer Satisfaction



Electric Business Customer Satisfaction Study - Large Utility East					
Annual Values					
	2012	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	638	659	685	702	757
First Quartile	638	653	665	696	756
Second Quartile	625	636	656	683	741
Third Quartile	611	620	644	675	721

Source: JD Power

EXHIBIT P-6
Schedule MJA-23
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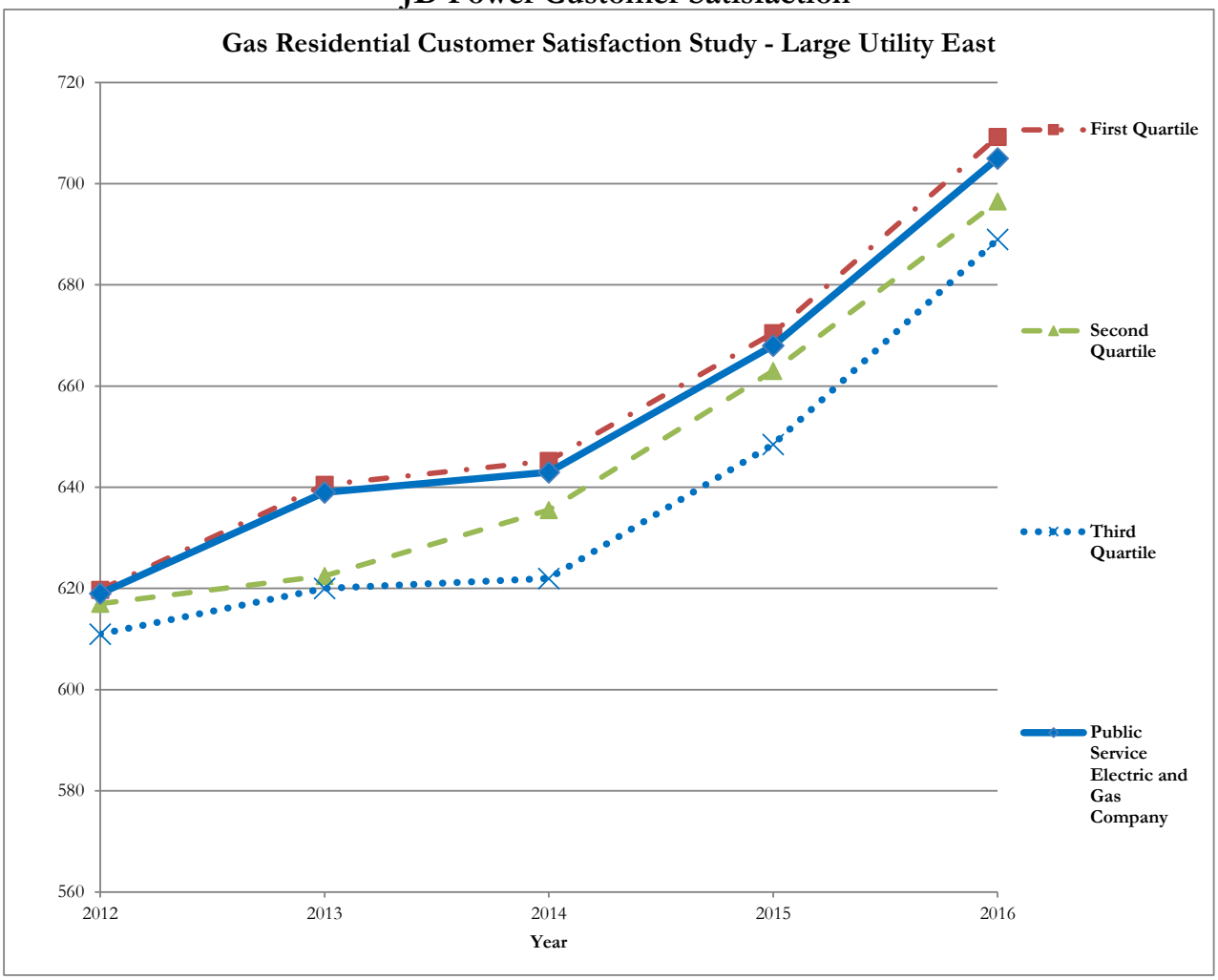
JD Power Customer Satisfaction



Gas Residential Customer Satisfaction Study - Large Utility East					
Annual Values					
	2012	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	619	639	643	668	705
First Quartile	620	641	645	671	709
Second Quartile	617	623	636	663	697
Third Quartile	611	620	622	649	689

Source: JD Power

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Schedule MJA-24
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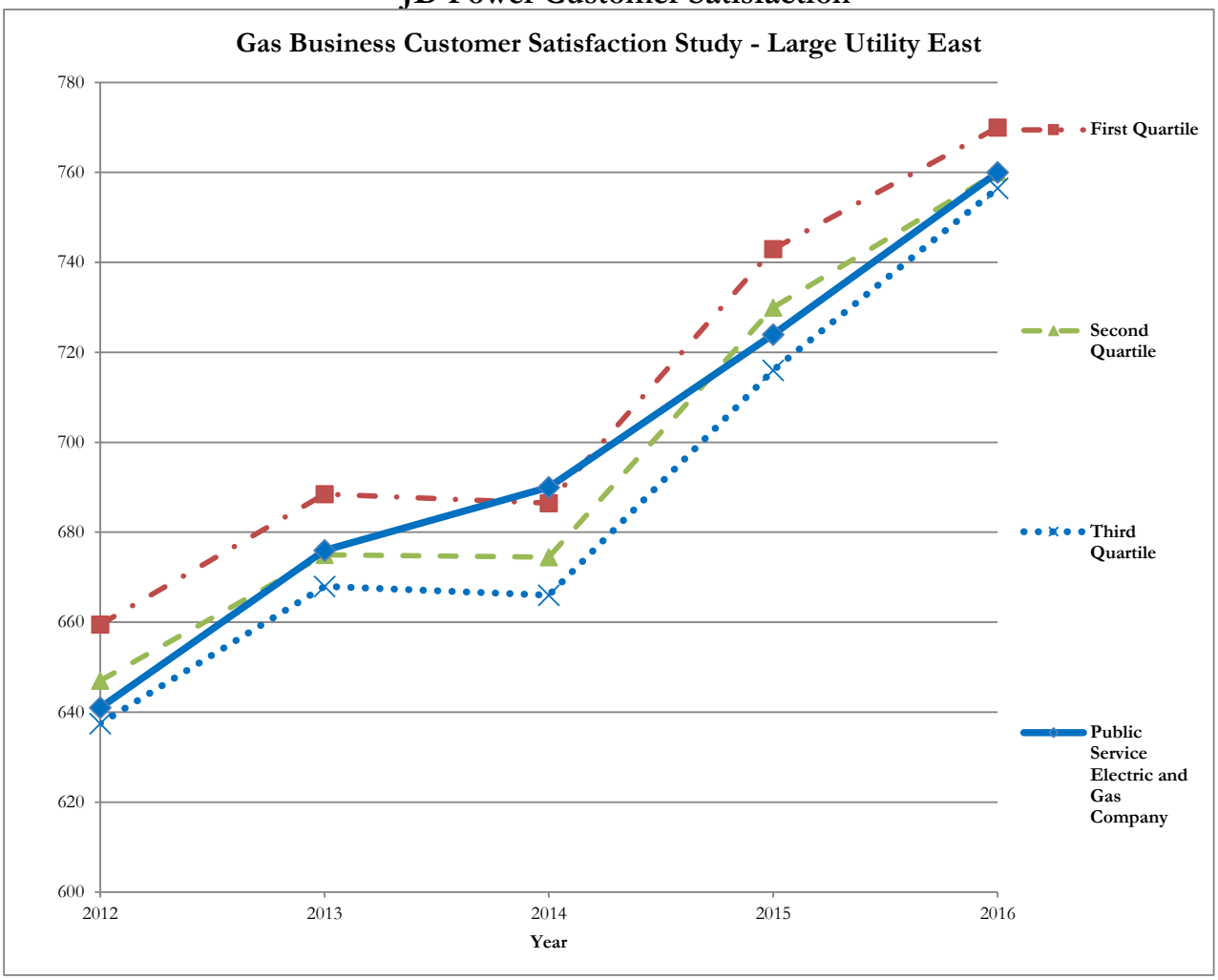
JD Power Customer Satisfaction



Gas Business Customer Satisfaction Study - Large Utility East					
Annual Values					
	2012	**2013**	**2014**	**2015**	**2016**
Public Service Electric and Gas Company	641	676	690	724	760
First Quartile	660	689	687	743	770
Second Quartile	647	675	675	730	760
Third Quartile	638	668	666	716	757

Source: JD Power

Company	Ticker	Covered by More Than One Analyst	Positive EPS Forecast from More Than 1 Source	Pays Dividends / No Cuts	Credit Rating	Regulated Income / Total Income	Regulated Electric Income / Total Regulated Income	Regulated Gas Income / Total Regulated Income	Regulated Gas Assets / Total Gas Assets	Merger & Acquisition Activity	Nuclear Risk	Other	In AEB Group?
Alliant Energy	LNT	Yes	Yes	Yes	A-	100%	92%	7%	8%	No	No		
Ameren	AEE	Yes	Yes	Yes	BBB+	101%	89%	11%	9%	No	No		Yes
Avista	AVA	Yes	Yes	Yes	BBB	100%	83%	17%	20%	Yes	No		
Black Hills	BKH	Yes	Yes	Yes	BBB	87%	60%	40%	31%	No	No		Yes
CMS Energy	CMS	Yes	Yes	Yes	BBB+	96%	73%	27%	29%	No	No		Yes
Centerpoint	CNP	Yes	Yes	Yes	A-	95%	68%	32%	26%	No	No		Yes
Consolidated Edison	ED	Yes	Yes	Yes	A-	98%	81%	16%	17%	No	No		Yes
DTE	DTE	Yes	Yes	Yes	BBB+	98%	80%	20%	15%	No	No		Yes
Duke Energy	DUK	Yes	Yes	Yes	A-	108%	97%	3%	4%	No	No		
Entergy	ETR	Yes	No	Yes	BBB+	-192%	99%	1%	1%	No	No	Wholesale Losses	
Exelon	EXC	Yes	Yes	Yes	BBB	60%	91%	9%	4%	No	No		
Fortis	FTS	Yes	Yes	Yes	A-	102%	0%	0%	0%	No	No	Canadian	
MGE Energy	MGEE	No	Yes	Yes	AA-	71%	75%	25%	21%	No	No		
PG&E	PCG	Yes	Yes	Yes	A-	100%	89%	11%	22%	No	No	Dividend Suspended	
PPL Corp	PPL	Yes	No	Yes	A-	110%	95%	5%	2%	No	No		
Southern	SO	Yes	Yes	Yes	A-	96%	98%	2%	7%	No	Yes		
Vectren	VVC	Yes	Yes	Yes	A-	85%	50%	45%	51%	No	No		
Xcel	XEL	Yes	Yes	Yes	A-	99%	88%	12%	12%	No	No		Yes
Companies Excluded		1	2			2	1	7	8	1	1	3	11

Combination Utility Group

Company	Ticker	[1] 13 Wk. Avg. Price	[2] Annualized Dividend	[3] 13 Wk. Avg. Dividend Yield	[4] Adjusted Dividend Yield	[5] Value Line EPS Forecast	[6] CFRA Forecasted EPS	[7] Schwab Forecasted EPS	[8] Average Growth Rate	[9] ROE	[10] ROE, With Exclusions	[10] ROE, With AEB Companies
Alliant Energy	LNT	42.71	1.34	3.1%	3.3%	6.0%	6.0%	7.1%	6.4%	9.7%	9.7%	
Ameren	AEE	60.13	1.83	3.0%	3.2%	6.0%	6.0%	7.2%	6.4%	9.6%	9.6%	9.6%
Avista	AVA	51.61	1.43	2.8%	2.9%	4.0%	6.6%		5.3%	8.2%	8.2%	
Black Hills	BKH	57.98	1.90	3.3%	3.5%	7.5%	5.0%	3.4%	5.3%	8.8%	8.8%	8.8%
CMS Energy	CMS	47.60	1.33	2.8%	3.0%	6.5%	8.0%	7.4%	7.3%	10.3%	10.3%	10.3%
Centerpoint	CNP	28.65	1.07	3.7%	4.0%	6.0%	9.0%	7.7%	7.6%	11.6%	11.6%	11.6%
Consolidated Edison	ED	84.86	2.76	3.3%	3.4%	2.5%	4.0%	2.9%	3.1%	6.5%		
DTE	DTE	110.07	3.53	3.2%	3.4%	6.0%	4.0%	5.2%	5.1%	8.4%	8.4%	8.4%
Duke Energy	DUK	84.91	3.56	4.2%	4.4%	4.5%	3.0%	5.2%	4.2%	8.6%	8.6%	
Entergy	ETR	82.49	3.56	4.3%	4.1%	-2.5%	nmf	-5.4%	-4.0%	0.2%		
Exelon	EXC	40.07	1.31	3.3%	3.4%	8.5%	2.0%	1.0%	3.8%	7.2%	7.2%	
Fortis	FTS	46.16	1.70	3.7%	4.0%	10.5%	na	5.5%	8.0%	12.0%	12.0%	
MGE Energy	MGEE	62.87	1.29	2.1%	2.2%	6.5%	3.7%		5.1%	7.3%	7.3%	
PG&E	PCG	49.92	2.12	4.2%	4.4%	9.5%	2.0%	2.1%	4.5%	9.0%	9.0%	
PPL Corp	PPL	33.76	1.58	4.7%	4.7%	nmf	nmf	0.0%	0.0%	4.7%		
Southern	SO	49.05	2.32	4.7%	4.9%	3.5%	3.0%	3.2%	3.2%	8.1%	8.1%	
Vectren	VVC	65.25	1.80	2.8%	2.9%	6.5%	6.0%		6.3%	9.2%	9.2%	
Xcel	XEL	48.77	1.44	3.0%	3.1%	4.5%	6.0%	6.0%	5.5%	8.6%	8.6%	8.6%
Companies Excluded				3.4%		5.6%	5.0%	3.9%	4.6%	8.2%	9.1%	9.6%

[1] Bloomberg Financial, 13 week average as of January 31, 2018
[2] Bloomberg Financial
[3] Equals [2] divided by [1]
[4] Equals [3] multiplied by (1 plus [8])
[5] Schedule KWO-1, Page 1;
[6] Schedule KWO-1, Page 1;
[7] Schedule KWO-1, Page 1;
[5] Average of [5], [6], and [7]
[9] Equals [4] plus [8]
[7] Equals [9] if [9] is greater than 7%

PSEG
GSMP II
CAPM Results

Combination Utility Group	[1] Risk Free Rate	[2] Beta	[3] Est. Market Required Return	[4] Equity Risk Premium	[5] Equity Cost Rate
Treasury - Maximum	2.98%	0.69	13.85%	10.87%	10.48%
Treasury - Average	2.82%	0.69	13.85%	11.03%	10.43%
Treasury - Minimum	2.68%	0.69	13.85%	11.17%	10.39%

Public Service Enterprise Group	Risk Free Rate	Beta	Est. Market Required Return	Equity Risk Premium	Equity Cost Rate
Treasury - Maximum	2.98%	0.70	13.85%	10.87%	10.59%
Treasury - Average	2.82%	0.70	13.85%	11.03%	10.54%
Treasury - Minimum	2.68%	0.70	13.85%	11.17%	10.50%

Gas Utility Comparable Group	Risk Free Rate	Beta	Est. Market Required Return	Equity Risk Premium	Equity Cost Rate
Treasury - Maximum	2.98%	0.76	13.85%	10.87%	11.24%
Treasury - Average	2.82%	0.76	13.85%	11.03%	11.20%
Treasury - Minimum	2.68%	0.76	13.85%	11.17%	11.17%

[1] Bloomberg Financial, 13-week min, max, and avg. as of January 31, 2018
[2] Schedule KWO-4
[3] Exhibit AEB-5 at [10]
[4] Column [3] minus Column [1]
[5] Column [1] plus column [2] multiplied by column [4]

CAPITAL STRUCTURE ANALYSIS

COMMON EQUITY RATIO [1]

Electric Proxy Group Company	Ticker	2017Q3	2017Q2	2017Q1	2016Q4	2016Q3	2016Q2	2016Q1	2015Q4	Average
Alliant Energy Corporation	LNT	50.81%	49.94%	49.51%	49.41%	49.24%	49.84%	50.28%	49.86%	49.86%
Ameren Corporation	AEE	52.80%	52.35%	52.01%	51.93%	53.06%	52.15%	52.10%	51.44%	52.23%
Avista Corporation	AVA	50.47%	52.00%	51.96%	51.40%	51.12%	52.22%	51.81%	50.85%	51.48%
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%
Duke Energy Corporation	DUK	53.02%	53.20%	52.92%	53.10%	53.18%	53.87%	54.89%	55.90%	53.76%
Entergy Corporation	ETR	48.05%	47.10%	48.21%	47.84%	48.08%	47.76%	47.00%	48.85%	47.86%
Exelon Corporation	EXC	53.04%	53.56%	53.48%	52.99%	51.95%	51.83%	52.74%	52.04%	52.70%
Fortis Inc.	FTS	52.81%	52.62%	51.91%	51.51%	51.79%	51.27%	50.93%	50.71%	51.69%
MGE Energy, Inc.	MGEE	60.49%	60.07%	60.02%	60.66%	61.30%	61.96%	62.00%	61.90%	61.05%
PG&E Corporation	PCG	52.61%	52.01%	51.46%	51.72%	51.27%	50.40%	50.14%	51.07%	51.34%
PPL Corporation	PPL	54.75%	57.21%	57.56%	57.40%	57.21%	57.09%	56.40%	56.07%	56.71%
Southern Company	SO	48.70%	49.24%	48.91%	49.35%	48.98%	48.10%	47.41%	48.42%	48.64%
Vectren Corporation	VVC	57.29%	56.89%	56.80%	56.66%	56.56%	56.15%	55.60%	55.40%	56.42%
Xcel Energy Inc.	XEL	53.76%	54.01%	54.75%	54.22%	53.62%	53.92%	54.87%	54.59%	54.22%
MEAN		52.10%	52.04%	51.97%	51.82%	51.72%	51.72%	51.71%	51.68%	51.85%
LOW		40.69%	40.48%	40.77%	41.04%	39.52%	41.47%	40.36%	40.27%	40.58%
HIGH		60.49%	60.07%	60.02%	60.66%	61.30%	61.96%	62.00%	61.90%	61.05%

COMMON EQUITY RATIO - UTILITY OPERATING COMPANIES [2]

Company Name	Ticker	2017Q3	2017Q2	2017Q1	2016Q4	2016Q3	2016Q2	2016Q1	2015Q4	Average
Interstate Power and Light Company	LNT	49.68%	48.78%	48.08%	48.09%	46.84%	48.15%	49.04%	48.44%	48.39%
Wisconsin Power and Light Company	LNT	52.39%	51.56%	51.45%	51.22%	52.38%	51.89%	51.78%	51.56%	51.78%
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%
Avista Corporation	AVA	49.89%	51.50%	51.48%	50.93%	50.65%	51.82%	51.39%	50.41%	51.01%
Alaska Electric Light and Power Company	AVA	60.67%	60.58%	60.23%	59.65%	59.29%	59.10%	58.86%	58.18%	59.57%
Black Hills Corporation	BKH	55.34%	53.96%	53.19%	52.72%	52.66%	52.47%	52.45%	52.39%	53.15%
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%
Duke Energy Carolinas, LLC	DUK	53.98%	53.49%	53.32%	52.81%	53.59%	53.84%	54.59%	58.07%	54.21%
Duke Energy Florida, LLC	DUK	49.46%	47.74%	46.95%	50.83%	50.52%	53.43%	55.81%	55.28%	51.25%
Duke Energy Indiana, LLC	DUK	51.71%	51.89%	52.15%	51.59%	51.14%	49.35%	50.89%	50.27%	51.12%
Duke Energy Kentucky, Inc.	DUK	50.69%	55.74%	55.43%	54.74%	54.87%	54.14%	53.94%	56.11%	54.46%
Duke Energy Ohio, Inc.	DUK	65.79%	65.38%	65.36%	66.39%	65.96%	65.21%	69.15%	68.71%	66.49%
Duke Energy Progress, LLC	DUK	51.06%	53.51%	52.99%	51.58%	51.37%	53.15%	52.70%	52.40%	52.35%
Entergy Arkansas, Inc.	ETR	45.42%	44.45%	46.05%	45.90%	45.86%	44.09%	44.26%	43.01%	44.88%
Entergy Louisiana, LLC	ETR	47.83%	46.77%	48.38%	47.87%	49.71%	49.30%	47.60%	51.13%	48.57%
Entergy Mississippi, Inc.	ETR	50.45%	49.68%	49.05%	48.67%	43.34%	47.29%	48.11%	47.71%	48.04%
Entergy Texas, Inc.	ETR	51.18%	50.30%	49.82%	49.56%	49.25%	47.89%	47.29%	49.96%	49.40%
Entergy Utility Group, Inc.	ETR	52.82%	52.46%	52.30%	52.39%	52.42%	51.44%	52.07%	56.80%	52.84%
Atlantic City Electric Company	EXC	49.37%	49.11%	49.06%	48.37%	48.88%	48.07%	44.14%	47.04%	48.01%
Baltimore Gas and Electric Company	EXC	53.70%	53.33%	53.37%	52.54%	48.79%	54.79%	54.75%	53.94%	53.15%
Commonwealth Edison Company	EXC	54.60%	55.22%	54.90%	54.52%	54.19%	51.51%	55.18%	54.99%	54.39%
Delmarva Power & Light Company	EXC	50.18%	50.13%	50.22%	49.43%	50.28%	49.41%	46.73%	49.05%	49.43%
PECO Energy Company	EXC	53.30%	55.64%	55.53%	55.13%	52.41%	54.44%	54.21%	53.80%	54.31%
Potomac Electric Power Company	EXC	49.71%	49.60%	49.86%	49.57%	49.86%	49.41%	47.30%	49.00%	49.29%
Central Hudson Gas & Electric Corporation	FTS	50.42%	51.22%	51.14%	50.58%	51.56%	51.58%	52.21%	51.44%	51.27%
CH Energy Group, Inc.	FTS	50.42%	51.22%	51.14%	50.58%	51.56%	51.58%	52.21%	51.44%	51.27%
Tucson Electric Power Company	FTS	53.56%	52.86%	51.91%	51.58%	51.71%	50.87%	50.19%	50.20%	51.61%
UNS Electric, Inc.	FTS	53.99%	54.77%	54.09%	53.62%	52.94%	53.27%	52.88%	52.56%	53.52%
UNS Energy Corporation	FTS	53.61%	53.08%	52.16%	51.81%	51.85%	51.14%	50.50%	50.47%	51.83%
Madison Gas and Electric Company	MGEE	60.49%	60.07%	60.02%	60.66%	61.30%	61.96%	62.00%	61.90%	61.05%
Pacific Gas and Electric Company	PCG	52.61%	52.01%	51.46%	51.72%	51.27%	50.40%	50.14%	51.07%	51.34%
Kentucky Utilities Company	PPL	53.93%	58.73%	58.62%	58.67%	58.62%	58.66%	58.47%	58.40%	58.01%
Louisville Gas and Electric Company	PPL	56.29%	60.06%	60.00%	60.33%	59.71%	59.33%	59.12%	58.50%	59.17%
PPL Electric Utilities Corporation	PPL	54.54%	54.43%	55.05%	54.32%	54.30%	54.21%	52.63%	52.25%	53.96%
Alabama Power Company	SO	46.20%	46.32%	46.07%	46.00%	46.31%	45.61%	45.51%	45.49%	45.94%
Georgia Power Company	SO	49.78%	50.94%	49.77%	51.01%	51.08%	49.86%	49.87%	50.43%	50.34%
Gulf Power Company	SO	54.97%	54.41%	55.63%	52.94%	50.68%	50.32%	48.03%	48.06%	51.88%
Mississippi Power Company	SO	46.93%	46.37%	49.22%	49.34%	46.50%	46.23%	42.18%	47.77%	46.82%
Southern Indiana Gas and Electric Company, Inc.	VVC	57.29%	56.89%	56.80%	56.66%	56.56%	56.15%	55.60%	55.40%	56.42%
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.

CAPITAL STRUCTURE ANALYSIS

LONG-TERM DEBT RATIO [1]

Electric Proxy Group Company	Ticker	2017Q3	2017Q2	2017Q1	2016Q4	2016Q3	2016Q2	2016Q1	2015Q4	Average
Alliant Energy Corporation	LNT	46.81%	47.64%	48.02%	48.12%	48.27%	47.56%	47.09%	47.50%	47.63%
Ameren Corporation	AEE	46.16%	46.60%	46.93%	47.01%	45.87%	46.75%	46.80%	47.49%	46.70%
Avista Corporation	AVA	49.53%	48.00%	48.04%	48.60%	48.88%	47.78%	48.19%	49.15%	48.52%
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%
Duke Energy Corporation	DUK	46.98%	46.80%	47.08%	46.90%	46.82%	46.13%	45.11%	44.10%	46.24%
Entergy Corporation	ETR	51.62%	52.57%	51.45%	51.81%	51.43%	51.31%	52.06%	50.13%	51.55%
Exelon Corporation	EXC	46.96%	46.44%	46.52%	47.01%	48.05%	47.65%	46.72%	47.53%	47.11%
Fortis Inc.	FTS	47.19%	47.38%	48.09%	48.49%	48.21%	48.73%	49.07%	49.29%	48.31%
MGE Energy, Inc.	MGEE	39.51%	39.93%	39.98%	39.34%	38.70%	38.04%	38.00%	38.10%	38.95%
PG&E Corporation	PCG	46.68%	47.27%	47.82%	47.55%	47.97%	48.83%	49.09%	48.15%	47.92%
PPL Corporation	PPL	45.25%	42.79%	42.44%	42.60%	42.79%	42.91%	43.60%	43.93%	43.29%
Southern Company	SO	49.47%	49.43%	49.50%	48.99%	49.35%	50.22%	50.90%	49.83%	49.71%
Vectren Corporation	VVC	42.71%	43.11%	43.20%	43.34%	43.44%	43.85%	44.40%	44.60%	43.58%
Xcel Energy Inc.	XEL	46.24%	45.99%	45.25%	45.78%	46.38%	46.08%	45.13%	45.41%	45.78%
MEAN		47.54%	47.62%	47.66%	47.81%	47.90%	47.84%	47.85%	47.87%	47.76%
LOW		39.51%	39.93%	39.98%	39.34%	38.70%	38.04%	38.00%	38.10%	38.95%
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
Interstate Power and Light Company	LNT	46.24%	47.07%	47.64%	47.64%	48.77%	47.12%	46.16%	46.71%	47.17%
Wisconsin Power and Light Company	LNT	47.61%	48.44%	48.55%	48.78%	47.62%	48.11%	48.22%	48.44%	48.22%
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%
Avista Corporation	AVA	50.11%	48.50%	48.52%	49.07%	49.35%	48.18%	48.61%	49.59%	48.99%
Alaska Electric Light and Power Company	AVA	39.33%	39.42%	39.77%	40.35%	40.71%	40.90%	41.14%	41.82%	40.43%
Black Hills Corporation	BKH	44.66%	46.04%	46.81%	47.28%	47.34%	47.53%	47.55%	47.61%	46.85%
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%
Duke Energy Carolinas, LLC	DUK	46.02%	46.51%	46.68%	47.19%	46.41%	46.16%	45.41%	41.93%	45.79%
Duke Energy Florida, LLC	DUK	50.54%	52.26%	53.05%	49.17%	49.48%	46.57%	44.19%	44.72%	48.75%
Duke Energy Indiana, LLC	DUK	48.29%	48.11%	47.85%	48.41%	48.86%	50.65%	49.11%	49.73%	48.88%
Duke Energy Kentucky, Inc.	DUK	49.31%	44.26%	44.57%	45.26%	45.13%	45.86%	46.06%	43.89%	45.54%
Duke Energy Ohio, Inc.	DUK	34.21%	34.62%	34.64%	33.61%	34.04%	34.79%	30.85%	31.29%	33.51%
Duke Energy Progress, LLC	DUK	48.94%	46.49%	47.01%	48.42%	48.63%	46.85%	47.30%	47.60%	47.65%
Entergy Arkansas, Inc.	ETR	53.99%	54.95%	53.31%	53.46%	53.50%	53.52%	53.29%	54.35%	53.80%
Entergy Louisiana, LLC	ETR	52.17%	53.23%	51.62%	52.13%	50.29%	50.70%	52.40%	48.87%	51.43%
Entergy Mississippi, Inc.	ETR	48.68%	49.44%	50.05%	50.42%	54.65%	50.41%	49.54%	49.92%	50.39%
Entergy Texas, Inc.	ETR	48.82%	49.70%	50.18%	50.44%	50.75%	52.11%	52.71%	50.04%	50.60%
Entergy Utility Group, Inc.	ETR	44.77%	45.12%	45.27%	45.19%	45.17%	46.09%	45.41%	39.99%	44.63%
Atlantic City Electric Company	EXC	50.63%	50.89%	50.94%	51.63%	51.12%	51.93%	55.86%	52.96%	51.99%
Baltimore Gas and Electric Company	EXC	46.30%	46.67%	46.63%	47.46%	51.21%	41.41%	41.47%	42.25%	45.43%
Commonwealth Edison Company	EXC	45.40%	44.78%	45.10%	45.48%	45.81%	48.49%	44.82%	45.01%	45.61%
Delmarva Power & Light Company	EXC	49.82%	49.87%	49.78%	50.57%	49.72%	50.59%	53.27%	50.95%	50.57%
PECO Energy Company	EXC	46.70%	44.36%	44.47%	44.87%	47.59%	45.56%	45.79%	46.20%	45.69%
Potomac Electric Power Company	EXC	50.29%	50.40%	50.14%	50.43%	50.14%	50.59%	52.70%	51.00%	50.71%
Central Hudson Gas & Electric Corporation	FTS	49.58%	48.78%	48.86%	49.42%	48.44%	48.42%	47.79%	48.56%	48.73%
CH Energy Group, Inc.	FTS	49.58%	48.78%	48.86%	49.42%	48.44%	48.42%	47.79%	48.56%	48.73%
Tucson Electric Power Company	FTS	46.44%	47.14%	48.09%	48.42%	48.29%	49.13%	49.81%	49.80%	48.39%
UNS Electric, Inc.	FTS	46.01%	45.23%	45.91%	46.38%	47.06%	46.73%	47.12%	47.44%	46.48%
UNS Energy Corporation	FTS	46.39%	46.92%	47.84%	48.19%	48.15%	48.86%	49.50%	49.53%	48.17%
Madison Gas and Electric Company	MGEE	39.51%	39.93%	39.98%	39.34%	38.70%	38.04%	38.00%	38.10%	38.95%
Pacific Gas and Electric Company	PCG	46.68%	47.27%	47.82%	47.55%	47.97%	48.83%	49.09%	48.15%	47.92%
Kentucky Utilities Company	PPL	46.07%	41.27%	41.38%	41.33%	41.38%	41.34%	41.53%	41.60%	41.99%
Louisville Gas and Electric Company	PPL	43.71%	39.94%	40.00%	39.67%	40.29%	40.67%	40.88%	41.50%	40.83%
PPL Electric Utilities Corporation	PPL	45.46%	45.57%	44.95%	45.68%	45.70%	45.79%	47.37%	47.75%	46.04%
Alabama Power Company	SO	50.19%	51.71%	51.95%	51.93%	51.63%	52.30%	52.40%	52.34%	51.80%
Georgia Power Company	SO	49.10%	47.88%	49.07%	47.78%	47.70%	48.91%	48.89%	48.30%	48.45%
Gulf Power Company	SO	45.03%	45.59%	38.99%	41.32%	43.81%	44.11%	46.63%	46.61%	44.01%
Mississippi Power Company	SO	52.25%	52.80%	50.22%	50.10%	52.91%	53.17%	57.22%	51.56%	52.53%
Southern Indiana Gas and Electric Company, Inc.	VVC	42.71%	43.11%	43.20%	43.34%	43.44%	43.85%	44.40%	44.60%	43.58%
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%	45.57%	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.

PREFERRED RATIO [1]

Electric Proxy Group Company	Ticker	2017Q3	2017Q2	2017Q1	2016Q4	2016Q3	2016Q2	2016Q1	2015Q4	Average
Alliant Energy Corporation	LNT	2.38%	2.42%	2.47%	2.47%	2.48%	2.60%	2.62%	2.64%	2.51%
Ameren Corporation	AEE	1.04%	1.05%	1.06%	1.06%	1.08%	1.10%	1.10%	1.07%	1.07%
Avista Corporation	AVA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Black Hills Corporation	BKH	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CenterPoint Energy, Inc.	CNP	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CMS Energy Corporation	CMS	0.31%	0.31%	0.31%	0.32%	0.32%	0.33%	0.34%	0.34%	0.32%
Consolidated Edison, Inc.	ED	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
DTE Energy Company	DTE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duke Energy Corporation	DUK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Entergy Corporation	ETR	0.33%	0.33%	0.34%	0.34%	0.49%	0.93%	0.94%	1.02%	0.59%
Exelon Corporation	EXC	0.00%	0.00%	0.00%	0.00%	0.00%	0.52%	0.54%	0.43%	0.19%
Fortis Inc.	FTS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MGE Energy, Inc.	MGEE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
PG&E Corporation	PCG	0.71%	0.71%	0.71%	0.74%	0.75%	0.77%	0.77%	0.78%	0.74%
PPL Corporation	PPL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Southern Company	SO	1.83%	1.33%	1.59%	1.66%	1.67%	1.68%	1.68%	1.75%	1.65%
Vectren Corporation	VVC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Xcel Energy Inc.	XEL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MEAN		0.37%	0.34%	0.36%	0.37%	0.38%	0.44%	0.44%	0.45%	0.39%
LOW		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HIGH		2.38%	2.42%	2.47%	2.47%	2.48%	2.60%	2.62%	2.64%	2.51%

		PREFERRED RATIO [1]								
Company Name	Ticker	2017Q3	2017Q2	2017Q1	2016Q4	2016Q3	2016Q2	2016Q1	2015Q4	Average
Interstate Power and Light Company	LNT	4.08%	4.15%	4.28%	4.28%	4.38%	4.73%	4.80%	4.85%	4.44%
Wisconsin Power and Light Company	LNT	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Ameren Illinois Company	AEE	1.06%	1.07%	1.08%	1.10%	1.15%	1.17%	1.14%	1.15%	1.11%
Union Electric Company	AEE	1.03%	1.04%	1.04%	1.03%	1.03%	1.05%	1.07%	1.02%	1.04%
Avista Corporation	AVA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Alaska Electric Light and Power Company	AVA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Black Hills Corporation	BKH	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Black Hills Colorado Electric Utility Company, LP	BKH	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Black Hills Power, Inc.	BKH	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Cheyenne Light, Fuel and Power Company	BKH	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CenterPoint Energy Houston Electric, LLC	CNP	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CenterPoint Energy Resources Corp.	CNP	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Consumers Energy Company	CMS	0.31%	0.31%	0.31%	0.32%	0.32%	0.33%	0.34%	0.34%	0.32%
Consolidated Edison Company of New York, Inc.	ED	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Orange and Rockland Utilities, Inc.	ED	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
DTE Electric Company	DTE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duke Energy Carolinas, LLC	DUK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duke Energy Florida, LLC	DUK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duke Energy Indiana, LLC	DUK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duke Energy Kentucky, Inc.	DUK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duke Energy Ohio, Inc.	DUK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duke Energy Progress, LLC	DUK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Entergy Arkansas, Inc.	ETR	0.59%	0.60%	0.64%	0.64%	0.64%	2.40%	2.44%	2.65%	1.32%
Entergy Louisiana, LLC	ETR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Entergy Mississippi, Inc.	ETR	0.87%	0.89%	0.90%	0.91%	2.02%	2.30%	2.36%	2.37%	1.58%
Entergy Texas, Inc.	ETR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Entergy Utility Group, Inc.	ETR	2.40%	2.42%	2.43%	2.43%	2.41%	2.46%	2.52%	3.21%	2.54%
Atlantic City Electric Company	EXC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Baltimore Gas and Electric Company	EXC	0.00%	0.00%	0.00%	0.00%	0.00%	3.80%	3.78%	3.81%	1.42%
Commonwealth Edison Company	EXC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Delmarva Power & Light Company	EXC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
PECO Energy Company	EXC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Potomac Electric Power Company	EXC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Central Hudson Gas & Electric Corporation	FTS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CH Energy Group, Inc.	FTS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Tucson Electric Power Company	FTS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
UNS Electric, Inc.	FTS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
UNS Energy Corporation	FTS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Madison Gas and Electric Company	MGEE	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Pacific Gas and Electric Company	PCG	0.71%	0.71%	0.71%	0.74%	0.75%	0.77%	0.77%	0.78%	0.74%
Kentucky Utilities Company	PPL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Louisville Gas and Electric Company	PPL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
PPL Electric Utilities Corporation	PPL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Alabama Power Company	SO	3.61%	1.97%	1.98%	2.08%	2.07%	2.09%	2.10%	2.17%	2.26%
Georgia Power Company	SO	1.12%	1.17%	1.15%	1.21%	1.22%	1.23%	1.24%	1.27%	1.20%
Gulf Power Company	SO	0.00%	0.00%	5.38%	5.73%	5.52%	5.56%	5.34%	5.34%	4.11%
Mississippi Power Company	SO	0.82%	0.83%	0.56%	0.56%	0.59%	0.59%	0.59%	0.68%	0.65%
Southern Indiana Gas and Electric Company, Inc.	VVC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Northern States Power Company - MN	XEL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Northern States Power Company - WI	XEL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Public Service Company of Colorado	XEL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Southwestern Public Service Company	XEL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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.

				Check				
2017Q3	2017Q2	2017Q1	2016Q4	2016Q3	2016Q2	2016Q1	2015Q4	Average
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Check

2017Q3	2017Q2	2017Q1	2016Q4	2016Q3	2016Q2	2016Q1	2015Q4	Average
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
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