Exhibit No.:
Issue(s): *Rate of Return*
Witness: *Seoung Joun Won, PhD*
Sponsoring Party: *MoPSC Staff*
Type of Exhibit: *Direct Testimony*
Case No.: *GR-2021-0320*
Date Testimony Prepared: *January 24, 2022*

MISSOURI PUBLIC SERVICE COMMISSION

FINANCIAL AND BUSINESS ANALYSIS DIVISION

FINANCIAL ANALYSIS DEPARTMENT

DIRECT TESTIMONY

OF

SEOUNG JOUN WON, PhD

THE EMPIRE DISTRICT GAS COMPANY, d/b/a Liberty (Empire)

CASE NO. GR-2021-0320

Jefferson City, Missouri
January 2022

** Denotes Confidential Information **

TABLE OF CONTENTS OF

DIRECT TESTIMONY OF

SEOUNG JOUN WON, PhD

THE EMPIRE DISTRICT GAS COMPANY,
d/b/a Liberty (Empire)

CASE NO. GR-2021-0320

DIRECT TESTIMONY

OF

SEOUNG JOUN WON, PhD

THE EMPIRE DISTRICT GAS COMPANY,
d/b/a Liberty (Empire)

CASE NO. GR-2021-0320

Q. Please state your name and business address.

A. My name is Seoung Joun Won and my business address is P.O. Box 360, Jefferson City, Missouri 65102.

Q. Who is your employer and what is your present position?

A. I am employed by the Missouri Public Service Commission ("Commission") and my title is Regulatory Compliance Manager for the Financial Analysis Department, in the Financial and Business Analysis Division.

Q. What is your educational and employment background?

A. I received my Bachelor of Arts, Master of Arts, and Doctor of Philosophy in Mathematics from Yonsei University and my Bachelor of Business Administration in Financial Accounting from Seoul Digital University in Seoul, South Korea, and earned my Doctor of Philosophy in Economics from the University of Missouri - Columbia. Also, I passed several certificate examinations for Finance Specialist in South Korea such as Accounting Management, Financial Risk Manager, Enterprise Resource Planning Accounting Consultant, Derivatives Investment Advisor, Securities Investment Advisor, and Financial Planner. Prior to joining the Commission, I taught both undergraduate and graduate level mathematics at the Korean Air Force Academy and Yonsei University for 13 years. I served as the Director of the Education and Technology Research Center in NeoEdu for 5 years. A more detailed account

of my educational background and occupational experience appears in Appendix 1, attached to this Direct Testimony.

Q. Have you previously filed testimony before the Commission?

A. Yes, I have appeared previously before the Commission. I have testified on rate of return, cost of capital, capital structure, finance issuance, feasibility analysis, valuation analysis on merger and acquisitions etc. Please refer to Appendix 1, attached to this Direct Testimony, for a list of my testimony, recommendation, or memorandum previously filed with the Commission and the associated issues.

Q. On behalf of whom are you testifying in this proceeding?

A. I am testifying in this Direct Testimony before the Commission on behalf of the Missouri Public Service Commission Staff ("Staff").

Q. What is the purpose of your direct testimony?

A. In this testimony, Staff presents evidence and provides a recommendation regarding the appropriate rate of return ("ROR") to be used in establishing the natural gas service rates of Empire District Gas Company, d/b/a Liberty (Empire) ("Empire Gas" or "EDG" or the "Company"), a subsidiary of Empire District Electric Company ("Empire Electric" or "EDE" or the "Parent") and an indirect, wholly-owned subsidiary of Algonquin Power & Utilities Corp. ("APUC").

Staff's analyses and conclusions are supported by the data presented in Schedules SJW-1 through SJW-17 of Appendix 2. Staff's workpapers will be provided to the parties at the time of the filing of this Direct Testimony. Staff will make any source documents of specific interest available upon the request of any party to this case or the Commission.

I. EXECUTIVE SUMMARY

Q. Please provide the summary of your methodology and findings concerning the ROR that should be utilized in setting rates for EDG's gas utility operations in this proceeding.

A. Staff estimated the market-based cost of common equity ("COE") for EDG using a comparative COE analysis. Staff's analysis takes into account changes in economic and capital market conditions over time by employing two widely-used and well-respected COE estimation methodologies: the discounted cash flow model ("DCF") and the capital asset pricing model ("CAPM").[1] The comparative COE analysis method allowed Staff to calculate the change in authorized return on equity ("ROE") based on the change in its COE estimate from period to period by using the Commission's most recent decision. The Commission's most recent, fully-litigated natural gas rate case is Spire Missouri's rate case in 2021.[2] By using the decision made by the Commission in the 2021 Spire Missouri rate case as a benchmark, Staff calculated a reasonable range of authorized ROE and recommended ROE.[3]

Staff also considered the current economic and financial market conditions to recommend a just and reasonable ROE. The current utility COE estimates are unusually and unsustainably high due to the effects of the coronavirus pandemic ("COVID-19"). When COVID-19 hit in 2020, it caused massive volatility in the economy and financial market.[4] Gross domestic product ("GDP") fell sharply, followed by an equally sharp recovery.[5] The recovery from the COVID-19 pandemic is spurring fears of higher inflation and, consequently,

[1] *Ass'n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.,* Opinion No. 569, 169 FERC ¶ 61,129 (2019).
[2] The most recent EDG general rate case, Case No. GR-2021-0108, was settled with no authorized ROE.
[3] COE is the return required by investors; ROE is the return set by a regulatory utility commission. Although some experts contend that COE and ROE are synonymous, Staff's position is that they need not be. Observed utility COEs have been generally significantly lower than ROEs in recent years.
[4] Federal Reserve Economic Data, retrieved November 18, 2021, https://fred.stlouisfed.org/series/VIXCLS.
[5] Bureau of Economic Analysis, U.S. Department of Commerce, retrieved November 18, 2021, https://www.bea.gov/news/2020/gross-domestic-product-third-quarter-2020-advance-estimate.

higher market risk.[6] Inflation fears can increase market risk for utilities as investors believe that regulators will not adjust revenues fast enough to compensate for rising input costs.[7] However, Staff agrees with the Federal Reserve ("Fed") that the path of the economy continues to depend on the course of the virus, but progress on vaccinations and an easing of supply constraints are expected to support continued gains in economic activity and employment as well as a reduction in inflation.[8]

Q. Please summarize the result of your comparative COE analysis and recommended ROR.

A. In the *Amended Report and Order* issued on November 12, 2021, in Case No. GR-2021-0108, the Commission found that a 9.37% ROE was fair and reasonable for calculating the revenue requirement for Spire Missouri.[9] For the current rate case, Staff recommends that the Commission set EDG's authorized ROE at 9.50%, the midpoint of a reasonable range of 9.25% and 9.75%.[10] Staff's recommended authorized ROE takes into consideration that natural gas utilities' COE estimates fell by one basis point since the period of the last Spire Missouri rate case.[11] Staff also considered the size of EDG compared to Spire Missouri, the current high inflation rate and the expected rise in interest rate. Staff's recommendation of a 9.50% authorized ROE will fairly compensate EDG for its current market COE and balance the interests of all stakeholders, particularly considering that the current market COE estimates for EDG are presently in the range of 7.09% to 9.20%

[6] S&P Global, Markets in Motion, retrieved November 18, 2021, https://www.spglobal.com/en/research-insights/featured/inflation.
[7] Hertford Funds, Insight, Which Equity Sectors Can Combat Higher Inflation?, retrieved November 18, 2021, https://www.hartfordfunds.com/dam/en/docs/pub/whitepapers/WP597.pdf.
[8] Federal Reserve issues Federal Open Market Committee (FOMC) statement, published December 15, 2021, and, retrieved December 25, 2021, https://www.federalreserve.gov/newsevents/pressreleases.htm.
[9] On page 97, *Amended Report and Order* issued November 12, 2021, in Case No. GR-2021-0108.
[10] Schedule SJW-16, Won's Direct Testimony.
[11] Schedule SJW-15, *Ibid*.

(see Schedule SJW-15). Staff also recommends that the Commission use EDE's consolidated capital structure of 53.84 percent common equity and 46.16 percent long-term debt for purposes of setting ROR in this proceeding.[12] Consistent with Staff's capital structure recommendation, Staff also recommends at this time that the Commission use EDE's embedded cost of debt of 3.76%, resulting in the overall midpoint ROR of 6.85%, taken from the calculated range of 6.72% to 6.99% (see Schedule SJW-16).

Q. Please explain how your direct testimony is organized.

A. Staff's testimony is organized into five sections. First, Staff discusses the applicable regulatory principles concerning cost of capital and ROR analysis that supports the just and reasonable rates for EDG's gas utility service. Second, Staff reviews the current economic environment and capital market conditions. Third, Staff presents the corporate analysis of EDG including EDE and its parent companies' business profile and credit ratings. Fourth, Staff explains its cost of capital and ROR analysis using EDG's capital structure. Fifth, Staff concludes with a presentation of Staff's recommended ROE, cost of debt and capital structure for EDG's allowed ROR for ratemaking purpose.

II. REGULATORY PRINCIPLES

Q. Please describe the regulatory principles that guide the determination of a just and reasonable ROR for a regulated utility.

A. The determination of a fair ROR is guided by principles of economic and financial theory and by certain minimum Constitutional standards. Investor-owned public utilities, such as EDG, are private property that the state may not confiscate without appropriate

[12] Staff Data Request No. 0187.

compensation. The United States Supreme Court has described the minimum characteristics of a constitutionally-acceptable ROR in two frequently-cited cases: *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia,* and *Federal Power Commission v. Hope Natural Gas Co.*[13]

From these two decisions, Staff derives and applies the following principles to guide it in recommending a just and reasonable ROR:

1. A return consistent with returns of investments of comparable risk;
2. A return that allows the utility to attract capital; and
3. A return sufficient to assure confidence in the utility's financial integrity.

Embodied in these three principles is the economic theory of the opportunity cost of investment. The opportunity cost of investment is the return that investors forego in order to invest in similar risk investment opportunities that vary depending on market and business conditions.

Methodologies of financial analysis have advanced greatly since the *Bluefield* and *Hope* decisions.[14] Additionally, today's utilities compete for capital in a global market rather than a local market. Nonetheless, the parameters defined in those cases are readily met using current methods and theory. The principle of commensurate return is based on the concept of risk. Financial theory holds that the return an investor may expect is reflective of the degree of risk inherent in the investment; risk being a measure of the likelihood that an investment will not perform as expected by that investor. Any line of business carries with it its own risks and it

[13] *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia,* 262 U.S. 679, 43 S.Ct. 675, 67 L.Ed. 1176 (1923); *Federal Power Commission v. Hope Natural Gas Co.,* 320 U.S. 591, 64 S.Ct. 281, 88 L.Ed. 333 (1943).

[14] Neither the Discounted Cash Flow ("DCF") nor the Capital Asset Pricing Model ("CAPM") methods were in use when those decisions were issued.

follows, therefore, that the return EDG's shareholders may expect is equal to that required by shareholders of comparable-risk utility companies.

Q. How do you estimate a just and reasonable authorized ROE regarding commensurate return and comparable-risk?

A. Staff employed a comparative COE analysis for authorized ROE estimation. COE is a market-determined, minimum return investors are willing to accept for their investment in a company compared to returns on other available investments. Using market data, COE can be directly estimated. An authorized ROE, on the other hand, is a Commission-determined return granted to monopoly industries, allowing them the opportunity to earn just and reasonable compensation for their investments in the rate base. Stock market data cannot directly determine an authorized ROE. However, using changes in estimated COEs over different periods of time, for a comparable group of companies having similar risks, a just and reasonable authorized ROE anticipated by financial market investors can be estimated.

Q. What are your conclusions regarding the regulatory principles that guide the determination of a just and reasonable ROE in this proceeding?

A. Staff has relied primarily on the analysis of a comparable group of companies to estimate the COE for EDG, applying this comparable-company approach through the use of both the DCF method and the CAPM analysis. Properly used and applied in appropriate circumstances, both the DCF and the CAPM can provide accurate estimates of utilities' COE. It is a well-accepted economic theory that a company that earns its cost of capital will be able to attract capital and maintain its financial integrity. Therefore, Staff's recommendation of authorized ROE based on the COE derived from the comparison of peer companies, is consistent with the principles set forth in *Bluefield* and *Hope*.

III. MARKET CONDITIONS

Q. Why is economic and capital market condition important for ROE analysis?

A. Determining whether a cost of capital estimate is just and reasonable requires a good understanding of current economic and capital market conditions, with the former having a significant impact on the latter. With this in mind, Staff emphasizes that an estimate of a utility's COE and authorized ROE recommendations should pass the "common sense" test when considering the broader current economic and capital market conditions.

1. Economic Condition

Q. Please summarize the current economic conditions regarding COE.

A. The economy is currently recovering from the COVID-19 pandemic recession. Although new variants of the COVID-19 have created some concerns about the sustainability of the recovery, economic growth has so far remained robust.[15] One of the major concerns of the current economic condition is the high inflation rate. However, in the view of experts, progress on vaccinations and an easing of supply constraints are expected to support a reduction in inflation.[16]

Furthermore, investors' expectation of high inflation has already been factored in since the beginning of 2021, which means that reduced real returns from investments have already been recognized in the financial market.[17] Therefore, high inflation rates do not necessarily mean higher cost of capital than presently reflected.

[15] Brookings, The Hamilton Project, 11 Facts on the Economic Recovery from the COVID-19 Pandemic, September 2021, https://www.brookings.edu/wp-content/uploads/2021/09/COVID-Facts-v3.pdf.
[16] Federal Reserve issues FOMC statement, published in December 15, 2021, retrieved in December 25, 2021, https://www.federalreserve.gov/newsevents/pressreleases.htm.
[17] Forbes, Jonathan Ponciano, Here's The Biggest Risk For The Stock Market This Year, According To Morgan Stanley Experts, Published January 4, 2021, retrieved November 22, 2021, https://www.forbes.com/sites/jonathanponciano/2021/01/04/biggest-risk-for-stock-market-this-year/?sh=31bfed21f80e.

Q. Please explain the current economic conditions using economic indicators.

A Since 2020, the economy experienced enormous volatility. Real GDP fell by 32.9% (on an annual basis) in the second quarter of 2020, after a 5% decline in the first quarter, and then the third and fourth quarters of 2020 saw real GDP increase by 33.4% and 4.3%, respectively.[18] Subsequently, first, second and third quarters of 2021 had real GDP growths of 6.3%, 6.7% and 2.1%, respectively.[19] It is expected that the year 2021 will wind up with GDP growth rate of about 5.7%.[20] Real GDP is projected to grow at 3.1%, and 1.1% in 2022 and 2023, respectively.[21] The Fed projects a long-term real GDP growth rate of 1.6% to 2.2%.[22] The U.S. Energy Information Administration ("EIA") projects a long-term real GDP growth rate of 2.1%.[23] The Congressional Budget Office ("CBO") projected a nominal GDP growth rate of 3.70% in July 2021, down from the 3.80% it previously projected in February 2021.[24]

Availability of vaccines, increased vaccination rates and the Fed's assurances to continue to support the economy are boosting prospects for continued economic recovery.[25] During economic recovery, utilities tend to underperform the broader market which, consequently, pushes COE for utilities higher. Compounded by the current fears of inflation, the share price of utility equities are currently depressed and COE elevated. As Staff alluded

[18] Bureau of Economic Analysis, retrieved in November 19, 2021, https://www.bea.gov/news/2021/gross-domestic-product-first-quarter-2021-advance-estimate.
[19] Bureau of Economic Analysis, Gross Domestic Product, Third Quarter 2021, retrieved in December 20, 2021, https://www.bea.gov/news/glance.
[20] S&P Global Ratings, Economic Outlook U.S. Q4 2021, published September 23, 2021.
[21] Congressional Budget Office, An Update to the Budget and Economic Outlook: 2021 to 2031, Ihttps://www.cbo.gov/system/files/2021-07/57218-Outlook.pdf.
[22] FOMC, Summary of Economic Projections, published September 22, 2021, https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20210922.pdf.
[23] Energy Information Administration, retrieved in November 19, 2021. https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2021&sourcekey=0.
[24] Congressional Budget Office, An Update to the Budget and Economic Outlook: 2021 to 2031, Ihttps://www.cbo.gov/system/files/2021-07/57218-Outlook.pdf.
[25] Federal Reserve, Press Release, November 3, 2021, https://www.federalreserve.gov/monetarypolicy/files/monetary20211103a1.pdf.

to, inflation fears are likely to subside in the future, meaning that COE should come down to more reasonable levels. Already there is evidence that inflation fears are subsiding. Long-term interest rates have come down from the high of about 2.45% reached in March 2021, to about 1.84% in December 2021.[26] All else the same, high inflation expectations lead to higher interest rates. The Fed still expects inflation to slow down to 2.2% next year, slightly above the Fed's long-term target of 2.0%.[27]

With COVID-19 causing widespread economic shutdown and pushing interest rates higher, the Fed intervened in March 2020 to cut the federal discount rate to a range of 0% to 0.25%.[28] The Fed decided to keep the target range for the federal funds rate at 0 to 0.25% and expects it will be appropriate to maintain this target range until labor market conditions have reached levels consistent with the Fed's assessments of maximum employment.[29] The Fed started to reduce the monthly pace of its net asset purchases with the progress of the economy.[30]

In addition to cutting the federal discount rate at the beginning of the COVID-19 recession, the Fed announced it would purchase an additional $700 billion worth of Treasury bonds and mortgage-backed securities.[31] The Fed also struck a deal with five other foreign central banks, the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, and the Swiss National Bank, to lower their rates on currency swaps to keep the

[26] Federal Reserve Economic Data, Market Yield on U.S. Treasury Securities at 30-Year Constant Maturity, https://fred.stlouisfed.org/series/DGS30.
[27] NPR, The Fed says inflation is hotter than expected but it should be cool next year, https://www.npr.org/2021/09/22/1039317128/federal-reserve-inflation-economy-taper-interest-rates.
[28] Reuters, Federal Reserve statement - lowering federal funds rate to 0 to .25%, published March 15, 2021, https://www.reuters.com/article/us-health-coronavirus-central-banks-fed-idUSKBN2121A0.
[29] Federal Reserve, Press Release, November 3, 2021, https://www.federalreserve.gov/monetarypolicy/files/monetary20211103a1.pdf.
[30] Federal Reserve issues FOMC statement, published in December 15, 2021, retrieved in December 25, 2021, https://www.federalreserve.gov/newsevents/pressreleases.htm.
[31] The Wall Street Journal, Fed Cuts Rates to Near Zero, published March 15, 2021, https://www.wsj.com/articles/fed-faces-crucial-decisions-to-alleviate-virus-shock-11584303662.

financial markets functioning normally.[32] Lowering rates on currency swaps makes borrowing U.S. dollars by banks around the world cheaper. The aggregate effect of the Fed's actions was a decline in interest rates from 2.34% in March 2021 to a low of 1.84% in December 2021.[33] As of December 3, 2021, 30-year Treasury yields are at 1.69%:[34]

Figure 1. 30-year Treasury yield and Infraction Rate 2019-2021[35]

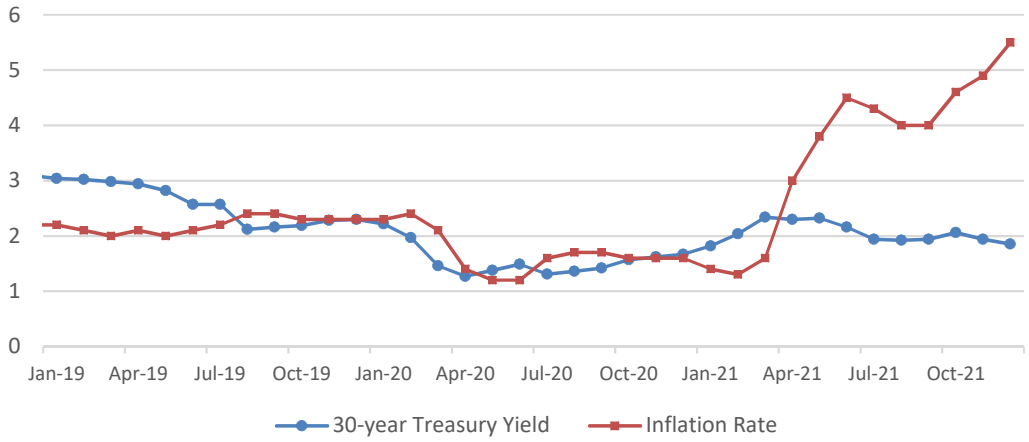


Figure 1 compares 30-year Treasury yields and the U.S. inflation rate 2019 through 2021. The effects of COVID-19, such as high inflation fears, have increased market risk and, consequently, pushed utilities' COE higher. As the Fed signals that it is about to start scaling back on the COVID-19 economic measures through tapering, it is expected that interest rates will begin to rise.[36] With interest rates expected to rise as a result of the tapering, it is reasonable

[32] Fed, Coordinated Central Bank Action to Enhance the Provision of U.S. Dollar Liquidity, https://www.federalreserve.gov/newsevents/pressreleases/monetary20200315c.htm.
[33] Federal Reserve Economic Data, Market Yield on U.S. Treasury Securities at 30-Year Constant Maturity, https://fred.stlouisfed.org/series/DGS30.
[34] Federal Reserve Economic Data, Market Yield on U.S. Treasury Securities at 30-Year Constant Maturity, https://fred.stlouisfed.org/series/DGS30.
[35] Won's Direct Workpaper.
[36] Tapering is a financial policy through central bank activities aiming at interest rates and at controlling investor perceptions of the future direction of interest rates. Tapering involves the slowing of asset purchases, which leads to the reversal of quantitative easing ("QE") policies implemented by a central bank.

to expect utilities' COE to remain elevated, though on a downward trend.[37] However, the Fed has a dual mandate: maximum employment and stable prices.[38] The current unemployment rate currently remains higher (3.9%) than the pre-pandemic level (3.5%).[39] The higher unemployment rate means that the economy is yet to fully recover to its pre-pandemic level and that supports a reasonable belief that the Fed will maintain near-zero interest rates to continue to support economic growth. In the Federal Open Market Committee meeting held on December 14-15, 2021, the Fed's growth forecast indicated policy makers expect the U.S. economy to grow by 4% in 2022 and unemployment to fall to 3.5% by year-end 2022.[40]

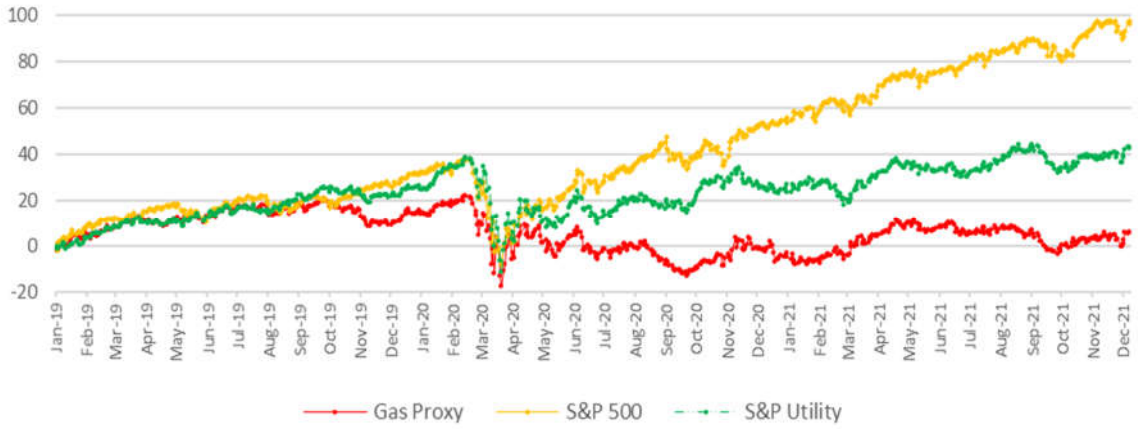
2. Capital Market Condition

Q. Please explain the current utility equity market conditions.

A. After the 2020 stock market crash caused by the COVID-19 pandemic, the utilities sector underperformed the broader market. As shown in Figure 2, the S&P 500 had total returns of 96.08% compared to 42.49% for the utilities sector. Staff's natural gas proxy group of companies under-performed considerably more, returning only 5.67% in the same period. A detailed analysis of the performance of the equity market since January 2019 reveals tremendous volatility. Figure 2 shows the volatility experienced by the stock market since January 2019. At the onset of the economic shutdown in March 2020, the S&P 500 and the Dow Jones Industrial fell 12.5% and 13%, respectively. Utilities were 35% off (down) their January 2020 high:

[37] Yahoo!Finance,, Fed's Waller: central bank should finish tapering bond buys, published November 19, 2021, https://finance.yahoo.com/news/fed-needs-faster-taper-more-160044688.html.
[38] Fed, What economic goals does the Federal Reserve seek to achieve through its monetary policy?, https://www.federalreserve.gov/faqs/what-economic-goals-does-federal-reserve-seek-to-achieve-through-monetary-policy.htm.
[39] Bureau of Labor Statistics, Unemployment Situation November 2021, https://www.bls.gov/news.release/pdf/empsit.pdf.
[40] Fed, Summary of Economic Projections, Published December 15, 2021, https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20211215.pdf.

Figure 2. Total Return 2019-2021[41]



Q. Please explain the current utility debt market conditions.

A. The utility debt market has not been stable in terms of bond yield changes. Average public utility yields fell from a high of 4.48% in January 2019, to a low of 3.16% in February 2020 (see Schedule SJW-4-1). This downward trend in public utility bond yields reversed when yields rose sharply by 43 bps to 3.59% in March 2020. There was a sharp rise in public utility bond yields in March 2020 and the subsequent sharp decline in the GDP. Public utility bond yields started to fall again in April 2020 after the Fed cut the federal funds rate to 0.0% to 0.25%, and ramped up Treasury bond-buying activity. By August 2020, public utility bond yields had fallen to 2.76% (see Schedule SJW-4-1). The changes in public utility bond yields mirrored the changes in the 30-Year Treasury bond yields. With a few exceptions, 30-Year Treasury bond yields have historically been positively correlated with public utility bond yields (see Schedule SJW-4-3). The biggest factor currently driving interest rates is the fear of an expected rise in inflation.

[41] Won's Direct Workpaper.

Q. Please explain how the current utility debt market conditions affect COE estimation.

A. Usually, in the past, interest rates were the main driver of COE change. Lower interest rates would normally mean lower COEs, all other things being equal. Currently, we see higher COE despite lower interest rates. Staff compared interest rates during the last Spire Missouri rate case period (January, February, and March 2021) to the current Empire Gas rate case period (October, November and December 2021) and noticed that interest rates, as measured by the Mergent public utility yields, decreased by about 9 basis points.[42]

The other important factor is the relative risk in the whole financial market between the current period and the period of Spire Missouri rate cases. The current economic and financial market dynamics show that risk, as measured by "beta", has remained the same compared to the period of Spire Missouri rate case. Beta is a measure of the volatility or systematic risk of a security or portfolio compared to the market as a whole. Current betas for Staff's electric proxy group are about 0.90 compared to 0.90 in the period of the last Spire Missouri rate case analysis.[43] Similar betas, all else remaining the same, mean similar COEs.

The combined net result of the decrease in interest rates and unchanged risk is a decrease in COE by 7 basis points (as indicated by the CAPM) since the time of Spire Missouri's last rate case.[44] However, because of the under-performance of the natural gas utilities in the stock market, the COE as estimated by the DCF rose by 6 basis points. Therefore, overall COE estimates of the natural gas proxy group have not changed much at all from the Spire 2021 rate case.

[42] Mergent Bond Record.
[43] Schedule SJW-14, Won's Direct Testimony.
[44] Schedule SJW-15, *Ibid*.

IV. CORPORATE ANALYSIS

Q. Please provide the corporate profile of EDG and its parent companies.

A. EDG operates 86 miles of gas transmission pipeline as part of its natural gas distribution system serving over 42,000 residential, commercial, and industrial customers in central, western, and northern Missouri. EDG is a wholly owned operating subsidiary of EDE. EDE is an investor-owned and regulated utility providing electric service (as well as natural gas service through its wholly owned subsidiary).

EDE provides electric and water service with approximately 218,000 customers in an area of approximately 10,000 square miles in southwest Missouri and the adjacent corners of the states of Arkansas, Oklahoma, and Kansas. EDE is regulated by Missouri Public Service Commission, Kansas Corporation Commission, the Corporation Commission of Oklahoma, the Arkansas Public Service Commission and the Federal Energy Regulatory Commission ("FERC").

On January 1, 2017, EDE was acquired by Liberty Utilities, Co. ("LUCo") which is wholly-owned by APUC. APUC serves approximately 800,000 customers in twelve states across the United States through its electric, gas, water, and wastewater utilities. In addition to its regulated utility business, APUC also operates its Liberty Power business, which owns approximately 1.36 GW of renewable generation in the United States and Canada.

While most of its day-to-day operations remain the same, there have been some changes in EDE's operations since the LUCo acquisition. For example, EDE is no longer publicly traded, although APUC is listed on the New York and Toronto Stock Exchanges. Another difference is that EDE is now part of a larger corporate family that operates other electric, gas, and water utilities.

With the passage of Senate Bill 564 in 2018, EDE has had the opportunity to improve its operations by reducing its regulatory lag. Moody's noted in its Credit Opinion on January 16, 2019, "[o]n a positive note, Missouri Senate Bill 564, passed in June 2018, is expected to provide a more supportive regulatory framework, thereby reducing regulatory lag and opening the possibility of greater spend in Missouri."(Moody's Credit Opinion, January 16, 2019). The bill provides the ability for electric utilities to update their rates in between general rate cases to account for changes in customer usage due to weather or conservation. Alternatively, utilities can institute plant-in-service accounting to defer and recover 85% of total depreciation expense and return on qualifying electric plant placed in-service." In 2020, EDE opted to use plant-in-service accounting (PISA), and is seeking to begin recovery of PISA deferrals in this rate case.

Q. What is EDG and its parent companies' credit ratings?

A. EDG does not receive an individual credit rating as a stand-alone entity. EDE is currently rated by Moody's and Standard & Poor's ("S&P"). The corporate credit ratings assigned to EDE by Moody's and S&P are 'Baa1' and 'BBB', respectively. These ratings are lower than natural gas utilities' average bond ratings of A3 and A- provided by Moody's and S&P, respectively. For instance, Spire Missouri got bond ratings of A1 and A- provided by Moody's and S&P, respectively. The corporate credit ratings assigned to APUC and LUCo by S&P is 'BBB'.[45]

[45] S&P Capital IQ Pro.

V. CAPITAL STRUCTURE

Q. What factors did Staff consider to determine a recommended capital structure used for ratemaking purposes for EDG's just and reasonable rates?

A. Staff considered two major factors for the recommendation of an appropriate capital structure for ratemaking in this proceeding. One is the financial relationship between EDG and its parent companies. The other is the merger conditions of the Case No. EM-2016-0213, in which APUC's acquisition of EDE was authorized by the Commission.[46]

Q. Please explain the financial relationship between EDG and its parent companies.

A. EDG is a wholly owned operating subsidiary of EDE. EDG does not have an issuer rating from Moody's or any rating agency and the first mortgage bonds issued by EDG are also not rated by Moody's or any rating agency.[47] With a few exceptions, all equity and debt financing at EDG was received from its parent companies and its affiliates.[48] EDG receives/provides short-term advances to/from EDE and LUCo through its regulated money-pool.[49] Since EDG's debts are not rated by credit rating agencies, EDG's stand-alone capital structure does not support its own credit rating.[50] LUCo has guaranteed debt issued by EDG's other parent companies.[51] Considering the financial relationship between EDG and its parent companies, Staff recommends to use a parent company's consolidated capital structure rather than EDG's standalone capital structure for purpose of ratemaking in this proceeding.

[46] Order Approving Stipulations and Agreements and Authorizing Merger Transaction, September 7, 2016, EM-2016-0213.
[47] Staff's Data Request No. 0099.
[48] Staff's Data Request No. 0061.
[49] Staff's Data Request No. 0069.
[50] S&P Capital IQ Pro.
[51] Staff's Data Request No. 0100.

Q. What was the merger conditions of the Case No. EM-2016-0213 considered by Staff to recommend capital structure for use in this proceeding?

A. Staff considered merger condition number 5, which reads as below:

> If Empire's per books capital structure is different from that of the entity or entities on which Empire relies for its financing needs, Empire shall be required to provide evidence in subsequent rate cases as to why Empire's per book capital structure is the most economical for purposes of determining a fair and reasonable allowed rate of return for purposes of determining Empire's revenue requirement.

Per merger condition 5, Staff looked at the capital structures of the two entities, LUCo and APUC (on which EDE relies for its financing), in addition to EDE's capital structure, to determine which one is more [most] economical. To determine which capital structure is more economical, Staff looked at which capital structure has the lowest equity ratio among the three (EDE, LUCo and APUC). In addition to merger condition 5 above, Staff was guided by the Commission's Order in the last EDE rate case (No. ER-2019-0374). In that case, the Commission accepted OPC's adjustments to LUCo's capital structure to add off-balance sheet debts guaranteed by LUCo to long-term debt, and subtract similar amounts of debt from the equity portion of LUCo's capital structure.

Q. What is, currently, the most economical capital structure among the three?

A. Table 1 below shows the average adjusted capital structures of the three entities (EDE, LUCo and APUC) through the first three quarters in 2021.[52] As seen in the Table 1, EDE's capital structure is the more economical capital structure. LUCo's capital structure has been adjusted to add $628,500,000 in off-balance sheet debt to long-term debt and, subtract the same amount from equity:[53]

[52] EDG is not included in the comparison because EDG's capital structure is not proper to use calculating ROR for this proceeding as explained above.
[53] Staff's Data Request No. 0187.

Table 1. Comparison Average Adjusted Capital Structure in Q1-Q3 2021[54]

Capital Component	APUC	LUCo	EDE
Common Stock Equity	64.14%	56.51%	52.90%
Preferred Stock	0.74%	0.00%	0.00%
Long-Term Debt	35.12%	43.49%	47.10%

Based on the average adjusted actual capital structures of 2021, EDE has a capital structure that contains the lowest equity ratio and consequently, the more economical capital structure.[55] According to the Commission's order, the Parties shall utilize a twelve-month test year ending December 31, 2020, updated through September 30, 2021.[56] EDE's capital structure measured at September 30, 2021 is also more economical than the other two capital structure alternatives at the same point in time. Accordingly, Staff recommends EDE's capital structure updated through September 30, 2021, composed of 53.84% common equity and 46.16% long-term debt be used for ratemaking purposes in this proceeding.[57] Staff's capital structure recommendation is subject to change depending on true-up data that may be provided by the Company.[58]

VI. RATE OR RETURN

Q. Please summarize the procedure that Staff used in its rate of return analysis.

A. In order to arrive at Staff's recommended ROR, Staff employed the comparative COE analysis. Staff specifically examined and evaluated: (1) the estimated COEs in the current EDG rate case and 2021 Spire Missouri rate case; (2) the just and reasonable range of the

[54] Won's Direct Workpaper.
[55] Staff's Direct Workpaper.
[56] On page 4, paragraph 2, Order Setting Procedural Schedule and Adopting Test Year issued October 20, 2021.
[57] Staff's Data Request No. 0187.1.
[58] On page 4, paragraph 3, Order Setting Procedural Schedule and Adopting Test Year.

authorized ROE agreed in 2021 Spire Missouri rate case; and (3) the current embedded cost of debt. For this procedure, Staff started with the selection of a natural gas proxy group.

1. Proxy Group

Q. How did you select the natural gas proxy group for the comparative COE analysis?

A. Staff used a proxy group consisting of U.S. utilities that Value Line classifies as Gas Utilities. Staff screened seven companies (see Schedule SJW-9) by ensuring that companies:

- are publicly traded;
- have more than five years of financial data available;
- have investment grade credit ratings from major U.S. credit rating agencies;
- have long-term growth coverage from at least two analysts;
- have no pending merger or acquisitions;
- have not reduced dividends since 2015;
- have at least 65% of income from regulated operations; and
- have at least 65% of assets in gas distribution operations.

Q. What is Staff's natural gas proxy group for the comparative COE analysis?

A. The seven gas utilities that met these criteria are presented in Table 2:

Table 2. Gas Utility Proxy Group

Gas Utility Companies	Ticker
Atmos Energy Corporation	ATO
New Jersey Resources Corporation	NJR
Northwest Natural Holding Company	NWN
ONE Gas, Inc.	OGS
South Jersey Industries, Inc.	SJI
Southwest Gas Holdings, Inc.	SWX
Spire Inc.	SR

2. Cost of Common Equity

Q. Please explain how Staff conducted comparative COE analysis.

A. Staff estimated EDG's COE through a comparable company cost-of-equity analysis using a proxy group of gas utility companies, applying the DCF model and a CAPM analysis, and testing the reasonableness of the results using a bond yield-plus risk premium method and other methods. Staff compared the DCF and CAPM COE estimates from the current and the 2021 Spire Missouri rate case. Combining these COE estimates and applying them proportionately allowed Staff to estimate a sensible range of recommended authorized ROEs. Additionally, Staff used a survey of other indicators and compared its recommendation to recently authorized ROEs in other Commission jurisdictions as a check of the reasonableness of its recommendation.

Q. Please explain the DCF model used for Staff's comparative COE analysis.

A. The DCF model is widely used by investors to evaluate stable-growth investment opportunities, such as regulated utility companies. The premise of the DCF model is that an investment in common stock is worth the present value of the infinite stream of dividends discounted at a market rate commensurate with the investment's risk. Using the following formula of the DCF model, investors determine common stock price:

$$P = D/(k - g),$$

where P is the common stock price,
D is the current dividend,
k is investors' required return from the stock, and
g is the expected growth rate in dividends.

In rate cases, the investors' required return from the stock could be considered to be the expected market COE of utility stock investors. Staff uses an adjusted dividend yield $(1 + .5g)D$ to account for the fact that the dividends are paid on quarterly basis. For the growth rate, Staff uses analysts' projected earnings per share ("EPS") growth estimates and long-term GDP growth estimates, combined together into a single growth rate, at 80% the average projected growth rates of EPS (Value Line, S&P and Zacks) and 20% long-term projected GDP growth estimates (see Schedule SJW-11).[59] It is important that the growth rate used in Staff's constant-growth DCF model reflects the long-term investment horizon assumption implied in the constant-growth DCF model. FERC also agreed as much when it ruled, in Opinion 569, that exclusive use of short-term analysts' growth rates in the constant-growth DCF was inappropriate.[60] The COE estimate using the above formulation of the constant-growth DCF can be expressed as follows:

$$k = (1 + .5g)D \,/\, P \; + \; g.$$

Q. What is the result of the comparative COE analysis using the DCF model?

A. For the current rate case, the proxy group DCF analysis resulted in a DCF COE estimate range of 9.08% to 9.32%, with a proxy group average COE point estimate of 9.20% (see Schedule SJW-13). For the 2021 Spire Missouri rate cases, Staff recalculated the proxy group's COE using the constant-growth DCF analysis. The recalculation resulted in a DCF COE range of 9.03% to 9.25%, with a proxy group average COE point estimate of 9.14% (see Schedule SJW-13). Based on a comparative DCF analysis, the COE estimate has increased by 6 basis points from the last Spire Missouri rate cases.

[59] *Entergy Arkansas, Inc*., Opinion No. 575, 175 FERC ¶ 61,136 (2021).
[60] *Ass'n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.,* Opinion No. 569, 169 FERC ¶ 61,129 (2019).

Q. Please explain the CAPM analysis used for Staff's comparative COE analysis.

A. The CAPM is built on the premise that the variance in returns over time is the appropriate measure of risk, but only the non-diversifiable variance (systematic risk) is rewarded. Systematic risks, also called market risks, are unanticipated events that affect almost all assets to some degree because the effects are economy wide. Systematic risk in an asset, relative to the average, is measured by the beta of that asset.[61] Unsystematic risks, also called asset-specific risks, are unanticipated events that affect single assets or small groups of assets. Because unsystematic risks can be freely eliminated by diversification, the appropriate reward for bearing risk depends on the level of systematic risk.

The CAPM shows that the expected return for a particular asset depends on pure time value of money (measured by the risk free rate), the amount of the reward for bearing systematic risk (measured by the market risk premium ("MRP")), and the amount of systematic risk incurred by the asset (measured by beta). Specifically, the CAPM methodology estimates the cost of equity by taking the risk-free rate and adding to it the MRP multiplied by beta.[62] The MRP is calculated by subtracting the risk-free rate from the expected market return. The general form of the CAPM is as follows:

$$k = R_f + \beta(R_m - R_f)$$

where,

k	is the expected return on equity for a security,
R_f	is the risk-free rate,
R_m	is the expected market return,
β	is beta, and
$R_m - R_f$	is the MRP.

[61] Beta is a measure of the volatility—or systematic risk—of a security or portfolio compared to the market as a whole. (Investopedia, retrieved November 5, 2020).
[62] Roger A. Morin, New Regulatory Finance (Public Utilities Reports, Inc. 2006).

For the risk-free rate, Staff used the average yield on 30-year U.S. Treasury bonds for the three-month period ending March 31 and December 31, 2021, and those figures were 2.07% and 1.95%, respectively. For beta, Staff relied on Value Line betas. MRP can vary widely depending on estimating methodology. For the MRP estimate, Staff relied on four sets of data. The first data set is the long-term geometric mean of historical return differences between large company stocks and long-term government bonds from 1926-2020, resulting in an MRP estimate of 4.63%.[63] The second data set is the long-term arithmetic mean of historical return differences between large company stocks and long-term government bonds from 1926-2020, resulting in an MRP estimate of 6.07%.[64] The third data set is the long-term geometric mean of historical return differences between S&P 500 and long-term government bonds from 1928-2020, resulting in an MRP estimate of 4.84%.[65] The fourth data set is the long-term arithmetic mean of historical return differences between S&P 500 and long-term government bonds from 1928-2020, resulting in an MRP estimate of 6.43%.[66]

Q. What is the result of the comparative COE analysis result using the CAPM?

A. The proxy group CAPM analysis resulted in a CAPM COE estimate range of 5.71% to 8.47% with an average of 7.09% for the current rate case and 5.83% to 8.48% with an average of 7.16% for the Spire Missouri 2021 rate case (see Schedule SJW-14), which indicates a decrease of 7 bps in COE since the Spire Missouri rate case.

3. Test of Reasonableness

Q. Please explain your tests of the reasonableness for Staff's COE estimates.

[63] Duff & Phelps, the Stocks, Bonds, Bills, and Inflation (SBBI®) Monthly Dataset.
[64] Ibid.
[65] Risk Premium, Damodaran Online, Stern School of Business, NYU.
[66] Ibid.

A. Staff used the bond yield-plus risk premium method to test the reasonableness of Staff's COE estimates. The bond yield-plus risk premium method, called the "rule of thumb" test of reasonableness in the CFA study guide, estimates the COE by simply adding an equity risk premium to the yield-to-maturity ("YTM") of the subject company's long-term debt.[67] Based on general U.S. capital-market experience and regulated utilities, the typical equity risk premium is in the 4% to 6% range.[68] For the three months ended through December 31, 2021, "A" rated and "Baa" rated long-term utility bonds had average yields of 3.08% and 3.31% respectively.[69] Adding the 4% to 6% risk premium, the "rule of thumb" indicates a cost of common equity between 7.08% and 9.31%. To the extent that the bond yield-plus risk premium COE estimate range of 7.08% to 9.31% overlaps Staff's COE estimate range of 7.09% to 9.20%, the bond yield-plus risk premium COE estimate supports the reasonableness of Staff's COE estimate of 8.14%.

In addition, U.S. Treasury yields and utility bond yields are quite low (at levels last experienced in the early 1960s) and the spread between them is presently below their long-term average (see Schedule SJW-4-4). Lower U.S. Treasury yields, and a narrower spread between U.S. Treasury yields (risk-free rate) and utility yields (see Schedule SJW-4-2), mean that investors are requiring lower risk premiums, which consequently means that investors are requiring lower returns. However, natural gas utility significantly underperformed the overall market.[70] Therefore, it is common sense in today's capital market environment that investors are only requiring modest returns, in the 6.5 to 9.5 percent range, on their utility common equity

[67] Stowe, J. D., Robinson, T. R., Pinto, J. E., & McLeavey, D. W. (2002) Analysis of Equity Investment: Valuation. Association for Investment Management and Research.
[68] Roger A. Morin, New Regulatory Finance (Public Utilities Reports, Inc. 2006).
[69] Mergent Bond Record, December 2021.
[70] Morin, R. A. (2006) New Regulatory Finance. Public Utilities Reports.

investments rather than the historical average returns.[71] As Staff explained in its discussion of other tests of reasonableness, these COE estimates are consistent with common sense tests. Therefore, Staff's DCF and CAPM calculations resulting in a range of COE estimates of 7.09% to 9.20% are reasonable.

4. Return on Equity

Q. Please explain Staff's methodology to determine the recommendation of authorized ROE in this proceeding.

A. In Spire Missouri's 2021 rate cases, the Commission determined, that for the purpose of calculating the revenue requirement, an authorized ROE of 9.37% was reasonable.[72] Based on an average of the results of Staff's DCF and CAPM analysis, the COE range estimate of 2021 Spire Missouri's rate case was 8.15% with a reasonable range 7.16% to 9.14%. With the same proxy group, Staff's DCF and CAPM analysis in the current EDG case results in a COE range estimate of 8.14% with a reasonable range 7.09% to 9.20%.[73] The difference between the two COEs is about 1 basis points, meaning that COE has not changed much and only declined by 1 basis points since the 2021 Spire Missouri rate cases. If there is no significant change in the Commission's perspectives on the relationship between the COE estimate and the authorized ROE, it is reasonable to conclude that the current authorized ROE should be set approximately 1 basis point lower than the authorized ROE of 9.37% in the 2021 Spire Missouri case.

However, to recommend a just and reasonable authorized ROE, Staff considered EDG's unique risk profiles and capital market conditions. First, EDG is much smaller in size than

[71] Duff & Phelps, Basic Building Blocks of the Cost of Equity Capital.
[72] Amended Report and Order issued on November 12, 2021, in Case Nos. GR-2021-0108.
[73] Schedule SJW-15, Won's Direct Testimony.

Spire Missouri. In terms of total capital, EDG is less than 5% of Spire Missouri in 2021.[74] Second, the current U.S. inflation rate is almost at its highest level in 40 years.[75] The Fed previously forecasted that a higher inflation rate reflected "transitory" factors as during the period of the 2021 Spire Missouri rate case but not anymore.[76] Finally, interest rates are expected to rise after the Fed Chair Powell announced probable interest rate increases in 2022.[77] Considering all of the above information that Staff has reviewed, Staff recommends the Commission authorize an ROE of 9.50% for EDG in this proceeding.

Q. Do you have any supporting evidence that the Commission can determine the reasonableness of Staff's recommendation of authorized ROE?

A. Staff recognizes that the Commission may be interested in recent authorized ROEs for other gas utility companies throughout the country to test the reasonableness of Staff's recommendation of authorized ROE. Table 3 presents information compiled and published by the Regulatory Research Associates ("RRA") which details the average authorized ROE's from Commissions around the U.S. in the years 2010 - 2021, along with the number of cases considered:

continued on next page

[74] S&P Capital IQ Pro, https://www.capitaliq.spglobal.com.
[75] BBC News, https://news.yahoo.com/us-price-rises-hit-highest-140929152.html.
[76] Federal Reserve, Press Release, April 28, 2021, https://www.federalreserve.gov/monetarypolicy/files/monetary20210428a1.pdf.
[77] Transcript of Chair Powell's Press Conference, December 15, 2021.

Table 3. Authorized ROEs of Utility Rate Cases (2010-2021)[78]

	Natural Gas					
	Fully Litigated		Settled		Natural Gas Total	
Year	ROE (%)	Case (No.)	ROE (%)	Case (No.)	ROE (%)	Case (No.)
2010	10.08	27	10.30	12	10.15	39
2011	9.76	8	10.08	8	9.92	16
2012	9.92	21	9.99	14	9.94	35
2013	9.59	12	9.80	9	9.68	21
2014	9.98	15	9.51	11	9.78	26
2015	9.58	5	9.60	11	9.60	16
2016	9.61	10	9.50	16	9.54	26
2017	9.82	7	9.68	17	9.72	24
2018	9.59	17	9.59	23	9.59	40
2019	9.74	12	9.70	20	9.71	32
2020	9.44	12	9.47	22	9.46	34
2021	9.66	12	9.52	27	9.57	39

In 2021, the average authorized ROE is 9.57%. Staff's recommended authorized ROE of 9.50% is generally consistent with ROEs recently authorized for other utilities around the country. Staff believes that in order for EDG to be competitive on the capital market, it has to be given the opportunity to earn an ROE that is reasonably consistent with ROEs awarded to other utilities around the country.

5. Embedded Costs of Debt

Q. What is the proper embedded cost of debt to calculate ROR in this proceeding?

A. For purposes of setting EDG's ROR, Staff recommends at this time the use of EDE's embedded cost of debt as of September 30, 2021, which is 3.76%.[79] Again, Staff would update its recommended cost of debt later in this case to reflect EDG's actual embedded cost of debt as of the end of the true-up period once the true-up period is set.

[78] Regulated Research Associates, S&P Capital IQ Pro, Retrieved January 2, 2021.
[79] Staff Data Request No. 0187.

VII. CONCLUSION

Q. What is the conclusion of your direct testimony?

A. Considering all of the above financial and economic information and EDG's risk profiles reviewed by Staff, and taking into account the evidence that supports the conclusion that the cost of common equity for gas utility companies has approximately declined by 1 basis point since the last Spire Missouri rate case in 2021, Staff concludes that an authorized ROE of 9.50% (within a range of reasonableness of 9.25% to 9.75%), is just and reasonable for EDG. Because of the rapidly changing economic outlook, Staff's recommended authorized ROE will be updated if there are changes in the economic outlook that necessitate updating the recommended authorized ROE.

Using an authorized ROE of 9.50% results in an allowed ROR of 6.85% (see Schedule SJW-16) combined with embedded costs of debt of 3.76%, applied to a capital structure consisting of 46.16% long-term debt and 53.84% common equity.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of The Empire District Gas Company's d/b/a Liberty Request to File Tariffs to Change its Rates for Natural Gas Service	)))	Case No. GR-2021-0320

AFFIDAVIT OF SEOUNG JOUN WON, PhD

STATE OF MISSOURI	)	
	)	ss.
COUNTY OF COLE	)	

COMES NOW SEOUNG JOUN WON, PhD and on his oath declares that he is of sound mind and lawful age; that he contributed to the foregoing *Direct Testimony of Seoung Joun Won, PhD*; and that the same is true and correct according to his best knowledge and belief.

Further the Affiant sayeth not.

SEOUNG JOUN WON, PhD

JURAT

Subscribed and sworn before me, a duly constituted and authorized Notary Public, in and for the County of Cole, State of Missouri, at my office in Jefferson City, on this 20th day of January 2022.

D. SUZIE MANKIN
Notary Public - Notary Seal
State of Missouri
Commissioned for Cole County
My Commission Expires: April 04, 2025
Commission Number: 12412070

Notary Public

Credentials and Background of

Seoung Joun Won, PhD

I am currently employed as a Regulatory Compliance Manager in the Financial Analysis Department of the Financial and Business Analysis Division of the Missouri Public Service Commission. I have been employed at the Missouri Public Service Commission since May 2010.

I received my Bachelor of Arts, Master of Arts, and Doctor of Philosophy in Mathematics from Yonsei University and my Bachelor of Business Administration in Financial Accounting from Seoul Digital University in Seoul, South Korea, and earned my Doctor of Philosophy in Economics from the University of Missouri - Columbia. Also, I passed several certificate examinations for Finance Specialist in South Korea such as Accounting Management, Financial Risk Manager, Enterprise Resource Planning Accounting Consultant, Derivatives Investment Advisor, Securities Investment Advisor, and Financial Planner.

Prior to joining the Commission, I taught both undergraduate and graduate level mathematics at the Korean Air Force Academy and Yonsei University for 13 years. I served as the director of the Education and Technology Research Center in NeoEdu for 5 years. Before starting my current position at the Missouri Public Service Commission, I had served as a regulatory economist in Tariff/Rate Design Department.

My current duties at the Commission include financial analysis of rate of return and cost of equity, valuation analysis on merger and acquisition, due diligence review and supporting economic and statistical analysis.

List of Previous Testimony Filed

Seoung Joun Won, PhD

Case Number	Company	Issue
ER-2021-0312	Empire District Electric Co.	Rate of Return, Capital Structure
WF-2022-0066	Missouri American Water Company	Financing
GR-2021-0241	Union Electric Co., d/b/a Ameren Missouri	Rate of Return, Capital Structure
WF-2021-0131	Raytown Water Company	Financing Authority
GR-2021-0108	Spire Missouri, Inc.	Rate of Return, Capital Structure
EA-2021-0087	Ameren Transmission Company of Illinois	Financial Feasibility
EA-2020-0371	Union Electric Co., d/b/a Ameren Missouri	Financial Ability
SR-2020-0345	Missouri American Water Company	Rate of Return, Capital Structure
WR-2020-0344	Missouri American Water Company	Rate of Return, Capital Structure
EF-2020-0301	Evergy Missouri Metro	Financing Authority
WR-2020-0264	Raytown Water Company	Rate of Return, Capital Structure
WR-2020-0053	Confluence Rivers Utility Operating Company, Inc.	Rate of Return, Capital Structure
HM-2020-0039	Veolia Energy Kansas City, Inc. AIP Project Franklin Bidco	Merger and Acquisition
EO-2019-0133	KCP&L Greater Missouri Operations Company, Evergy Metro	Business Process Efficiency
EO-2019-0132	Kansas City Power & Light Company, Evergy Metro	Business Process Efficiency
GO-2019-0059	Spire West, Spire Missouri, Inc.	Weather Variables

cont'd List of Previous Testimony Filed

Seoung Joun Won, PhD

Case Number	Company	Issue
GO-2019-0058	Spire East., Spire Missouri, Inc.	Weather Variables
ER-2018-0146	KCP&L Greater Missouri Operations Co.	Weather & Normalization, Net System Input
ER-2018-0145	Kansas City Power & Light Co.	Weather & Normalization, Net System Input
GR-2018-0013	Liberty Utilities (Midstates Natural Gas) Corp.	Weather Variables
GR-2017-0216	Missouri Gas Energy (Laclede), Spire Missouri, Inc.	Weather Variables
GR-2017-0215	Laclede Gas Co., Spire Missouri, Inc.	Weather Variables
ER-2016-0285	Kansas City Power & Light Co.	Weather & Normalization, Net System Input
ER-2016-0179	Union Electric Co., d/b/a Ameren Missouri	Weather & Normalization, Net System Input
ER-2016-0156	KCP&L Greater Missouri Operations Co.	Weather & Normalization, Net System Input
ER-2016-0023	Empire District Electric Co.	Weather & Normalization, Net System Input
ER-2014-0370	Kansas City Power & Light Co	Weather & Normalization, Net System Input
ER-2014-0351	Empire District Electric Co.	Weather & Normalization, Net System Input
ER-2014-0258	Union Electric Co., d/b/a Ameren Missouri	Weather & Normalization, Net System Input
EC-2014-0223	Noranda Aluminum, Inc., et al, Complaint v. Union Electric Co., d/b/a Ameren Missouri	Weather Variables
GR-2014-0152	Liberty Utilities (Midstates Natural Gas) Corp.	Weather Variables
GR-2014-0086	Summit Natural Gas of Missouri, Inc.	Weather Variables

Case Number	Company	Issue
HR-2014-0066	Veolia Energy Kansas City, Inc.	Weather Variables, Revenue
GR-2013-0171	Laclede Gas Co.	Weather Variables
ER-2012-0345	Empire District Electric Co.	Weather Variables, Revenue
ER-2012-0175	KCP&L Greater Missouri Operations Co.	Weather Variables
ER-2012-0174	Kansas City Power & Light Co.	Weather Variables
ER-2012-0166	Union Electric Co., d/b/a Ameren Missouri	Weather Variables, Revenue
HR-2011-0241	Veolia Energy Kansas City, Inc.	Weather Variables
ER-2011-0028	Union Electric Co., d/b/a Ameren Missouri	Weather Variables, Revenue
ER-2011-0004	Empire District Electric Co.	Weather Variables, Revenue
GR-2010-0363	Union Electric Co., d/b/a Ameren Missouri	Weather Variables
ER-2010-0356	KCP&L Greater Missouri Operations Co.	Weather Variables
ER-2010-0355	Kansas City Power & Light Co.	Weather Variables, Revenue

Work Related Publication

Won, Seoung Joun, X. Henry Wang, and Henry E. Warren. "Climate normals and weather normalization for utility regulation." *Energy Economics* (2016).

DIRECT TESTIMONY

FOR

THE EMPIRE DISTRICT GAS COMPANY

CASE NO. GR-2021-0320

APPENDIX 2

SCHEDULES

BY

Seoung Joun Won, PhD

Financial Analysis

MISSOURI PUBLIC SERVICE COMMISSION

January 24, 2022

THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320

List of Schedules

THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320

Federal Reserve Discount Rates Changes and Federal Reserve Funds Rates Changes

Date	Federal Reserve Discount Rate	Federal Reserve Funds Rate		Date	Federal Reserve Discount Rate		Federal Reserve Funds Rate
01/01/83	8.50%			01/04/01	5.50%		6.00%
12/31/83	8.50%			01/31/01	5.00%		5.50%
04/09/84	9.00%			03/20/01	4.50%		5.00%
11/21/84	8.50%			04/18/01	4.00%		4.50%
12/24/84	8.00%			05/15/01	3.50%		4.00%
05/20/85	7.50%			06/27/01	3.25%		3.75%
03/07/86	7.00%			08/21/01	3.00%		3.50%
04/21/86	6.50%			09/17/01	2.50%		3.00%
07/11/86	6.00%			10/02/01	2.00%		2.50%
08/21/86	5.50%			11/06/01	1.50%		2.00%
09/04/87	6.00%			12/11/01	1.25%		1.75%
08/09/88	6.50%			11/06/02	0.75%		1.25%
02/24/89	7.00%			01/09/03	2.25%	**	1.25%
07/13/90		8.00%	*	06/25/03	2.00%		1.00%
10/29/90		7.75%		06/30/04	2.25%		1.25%
11/13/90		7.50%		08/10/04	2.50%		1.50%
12/07/90		7.25%		09/21/04	2.75%		1.75%
12/18/90		7.00%		11/10/04	3.00%		2.00%
12/19/90	6.50%			12/14/04	3.25%		2.25%
01/09/91		6.75%		02/02/05	3.50%		2.50%
02/01/91	6.00%	6.25%		03/22/05	3.75%		2.75%
03/08/91		6.00%		05/03/05	4.00%		3.00%
04/30/91	5.50%	5.75%		06/30/05	4.25%		3.25%
08/06/91		5.50%		08/09/05	4.50%		3.50%
09/13/91	5.00%	5.25%		09/20/05	4.75%		3.75%
10/31/91		5.00%		11/01/05	5.00%		4.00%
11/06/91	4.50%	4.75%		12/13/05	5.25%		4.25%
12/06/91		4.50%		01/31/06	5.50%		4.50%
12/20/91	3.50%	4.00%		03/28/06	5.75%		4.75%
04/09/92		3.75%		05/10/06	6.00%		5.00%
07/02/92	3.00%	3.25%		06/29/06	6.25%		5.25%
09/04/92		3.00%		08/17/07	5.75%		5.25%
01/01/93				09/18/07	5.25%		4.75%
12/31/93	No Changes	No Changes		10/31/07	5.00%		4.50%
02/04/94		3.25%		12/11/07	4.75%		4.25%
03/22/94		3.50%		01/22/08	4.00%		3.50%
04/18/94		3.75%		01/30/08	3.50%		3.00%
05/17/94	3.50%	4.25%		03/16/08	3.25%		2.25%
08/16/94	4.00%	4.75%		03/18/08	2.50%		2.25%
11/15/94	4.75%	5.50%		04/30/08	2.25%		2.00%
02/01/95	5.25%	6.00%		10/08/08	1.75%		1.50%
07/06/95		5.75%		10/28/08	1.25%		1.00%
12/19/95		5.50%		12/30/08	0.50%		0% - .25%
01/31/96	5.00%	5.25%		02/19/10	0.75%		0% - .25%
03/25/97		5.50%		12/17/15	1.00%		0.38%
12/12/97	5.00%			12/15/16	1.25%		0.54%
01/09/98	5.00%			03/16/17	1.50%		0.79%
03/06/98	5.00%			06/15/17	1.75%		1.04%
09/29/98		5.25%		12/14/17	2.00%		1.30%
10/15/98	4.75%	5.00%		03/22/18	2.25%		1.51%
11/17/98	4.50%	4.75%		06/14/18	2.50%		1.82%
06/30/99	4.50%	5.00%		09/27/18	2.75%		1.95%
08/24/99	4.75%	5.25%		12/20/18	3.00%		2.27%
11/16/99	5.00%	5.50%		08/01/19	2.75%		2.13%
02/02/00	5.25%	5.75%		09/19/19	2.50%		2.04%
03/21/00	5.50%	6.00%		10/31/19	2.25%		1.83%
05/19/00	6.00%	6.50%		03/04/20	1.75%		0.65%
01/03/01	5.75%	6.00%		03/16/20	0.25%		0.05%

* Staff began tracking the Federal Funds Rate.
**Revised discount window program begins. Reflects rate on primary credit. This revised discount window policy results in incomparability of the discount rates after January 9, 2003 to discount rates before January 9, 2003.

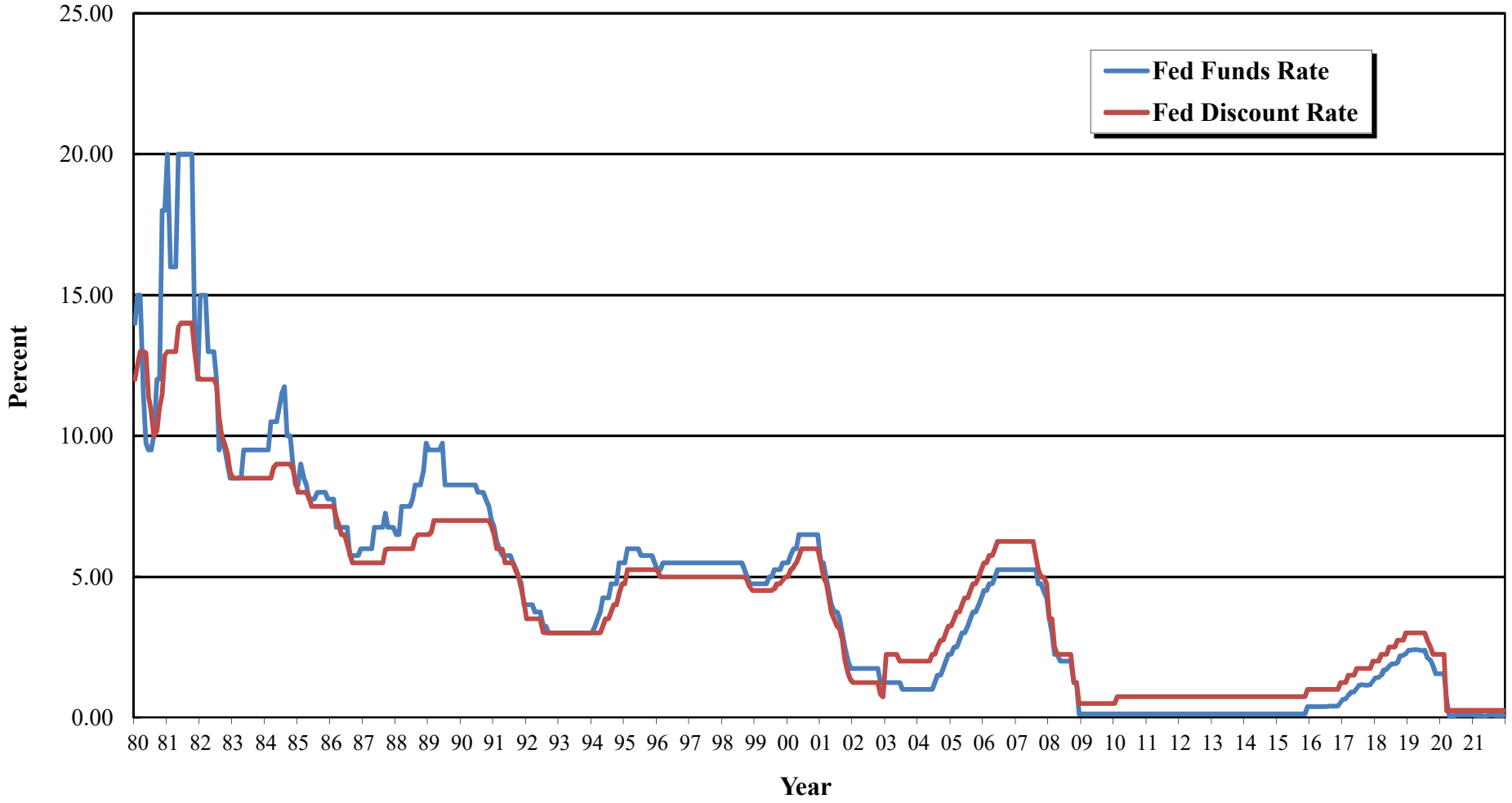
Source:
Federal Reserve Discount rate https://fred.stlouisfed.org/series/INTDSRUSM193N
Federal Reserve Funds rate https://fred.stlouisfed.org/series/FEDFUNDS

Note: Interest rates as of December 31 for each year are underlined.

SCHEDULE SJW-2-1

THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320

Federal Reserve Discount Rates and Federal Funds Rates
1980 - 2021



SCHEDULE SJW-2-2

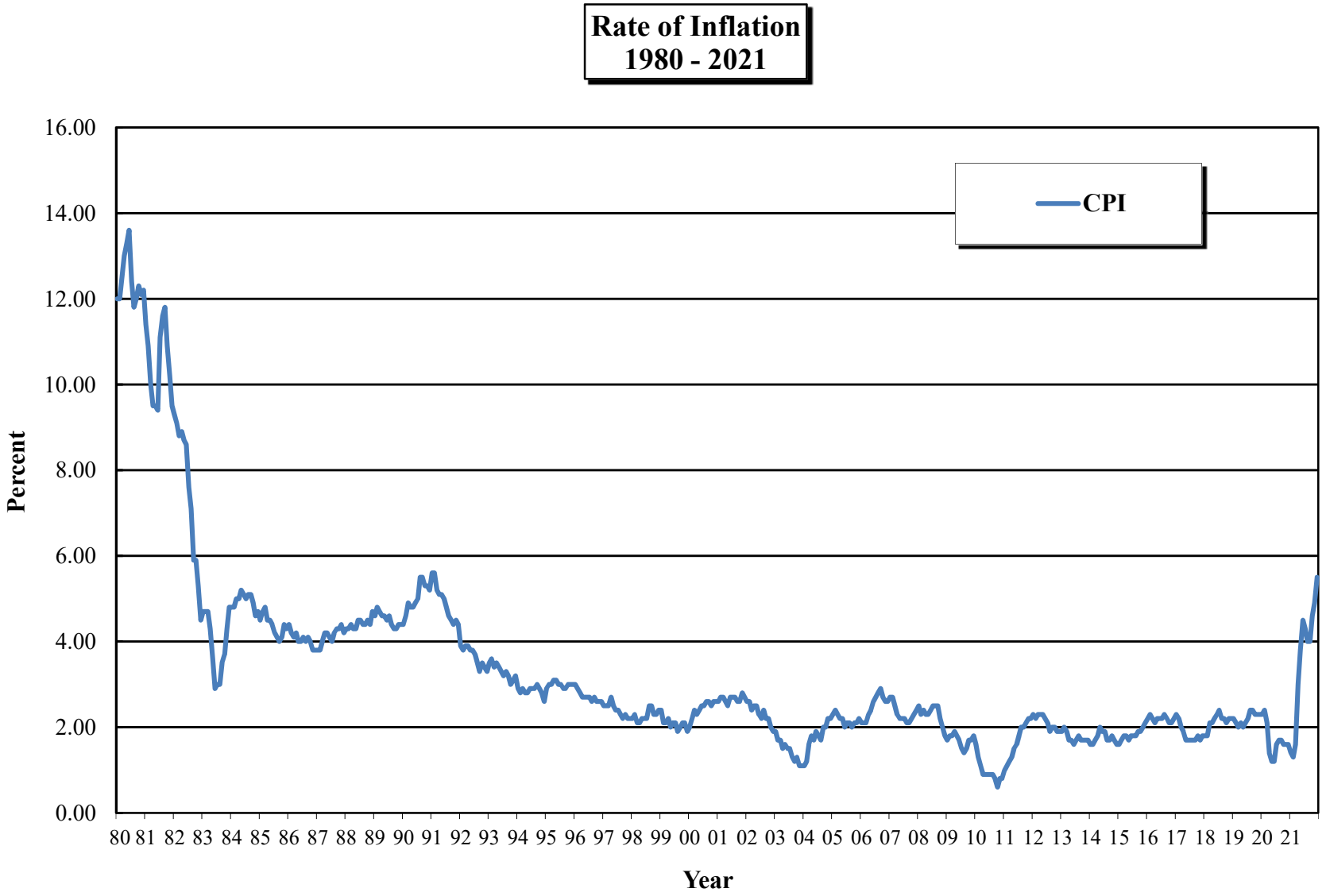
THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320

Rate of Inflation

Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1980	12.00	Jan 1986	4.40	Jan 1992	3.90	Jan 1998	2.20	Jan 2004	1.10	Jan 2010	1.60	Jan 2016	2.20
Feb	12.00	Feb	4.20	Feb	3.80	Feb	2.30	Feb	1.20	Feb	1.30	Feb	2.30
Mar	12.50	Mar	4.10	Mar	3.90	Mar	2.10	Mar	1.60	Mar	1.10	Mar	2.20
Apr	13.00	Apr	4.20	Apr	3.90	Apr	2.10	Apr	1.80	April	0.90	Apr	2.10
May	13.30	May	4.00	May	3.80	May	2.20	May	1.70	May	0.90	May	2.20
Jun	13.60	Jun	4.00	Jun	3.80	Jun	2.20	Jun	1.90	Jun	0.90	Jun	2.20
Jul	12.40	Jul	4.10	Jul	3.70	Jul	2.20	Jul	1.80	Jul	0.90	Jul	2.20
Aug	11.80	Aug	4.00	Aug	3.50	Aug	2.50	Aug	1.70	Aug	0.90	Aug	2.30
Sep	12.00	Sep	4.10	Sep	3.30	Sep	2.50	Sep	2.00	Sep	0.80	Sep	2.20
Oct	12.30	Oct	4.00	Oct	3.50	Oct	2.30	Oct	2.00	Oct	0.60	Oct	2.10
Nov	12.10	Nov	3.80	Nov	3.40	Nov	2.30	Nov	2.20	Nov	0.80	Nov	2.10
Dec	12.20	Dec	3.80	Dec	3.30	Dec	2.40	Dec	2.20	Dec	0.80	Dec	2.20
Jan 1981	11.40	Jan 1987	3.80	Jan 1993	3.50	Jan 1999	2.40	Jan 2005	2.30	Jan 2011	1.00	Jan 2017	2.30
Feb	10.90	Feb	3.80	Feb	3.60	Feb	2.10	Feb	2.40	Feb	1.10	Feb	2.20
Mar	10.00	Mar	4.00	Mar	3.40	Mar	2.10	Mar	2.30	Mar	1.20	Mar	2.00
Apr	9.50	Apr	4.20	Apr	3.50	Apr	2.20	Apr	2.20	Apr	1.30	Apr	1.90
May	9.50	May	4.20	May	3.40	May	2.00	May	2.20	May	1.50	May	1.70
Jun	9.40	Jun	4.10	Jun	3.30	Jun	2.10	Jun	2.00	Jun	1.60	Jun	1.70
Jul	11.10	Jul	4.00	Jul	3.20	Jul	2.10	Jul	2.10	Jul	1.80	July	1.70
Aug	11.60	Aug	4.20	Aug	3.30	Aug	1.90	Aug	2.10	Aug	2.00	Aug	1.70
Sep	11.80	Sep	4.30	Sep	3.20	Sep	2.00	Sep	2.00	Sep	2.00	Sep	1.70
Oct	10.90	Oct	4.30	Oct	3.00	Oct	2.10	Oct	2.10	Oct	2.10	Oct	1.80
Nov	10.20	Nov	4.40	Nov	3.10	Nov	2.10	Nov	2.10	Nov	2.20	Nov	1.70
Dec	9.50	Dec	4.20	Dec	3.20	Dec	1.90	Dec	2.20	Dec	2.20	Dec	1.80
Jan 1982	9.30	Jan 1988	4.30	Jan 1994	2.90	Jan 2000	2.00	Jan 2006	2.10	Jan 2012	2.30	Jan 2018	1.80
Feb	9.10	Feb	4.30	Feb	2.80	Feb	2.20	Feb	2.10	Feb	2.20	Feb	1.80
Mar	8.80	Mar	4.40	Mar	2.90	Mar	2.40	Mar	2.10	Mar	2.30	Mar	2.10
Apr	8.90	Apr	4.30	Apr	2.80	Apr	2.30	Apr	2.30	Apr	2.30	Apr	2.10
May	8.70	May	4.30	May	2.80	May	2.40	May	2.40	May	2.30	May	2.20
Jun	8.60	Jun	4.50	Jun	2.90	Jun	2.50	June	2.60	Jun	2.20	Jun	2.30
Jul	7.60	Jul	4.50	Jul	2.90	Jul	2.50	July	2.70	Jul	2.10	Jul	2.40
Aug	7.10	Aug	4.40	Aug	2.90	Aug	2.60	Aug	2.80	Aug	1.90	Aug	2.20
Sep	5.90	Sep	4.40	Sep	3.00	Sep	2.60	Sep	2.90	Sep	2.00	Sep	2.20
Oct	5.90	Oct	4.50	Oct	2.90	Oct	2.50	Oct	2.70	Oct	2.00	Oct	2.10
Nov	5.30	Nov	4.40	Nov	2.80	Nov	2.60	Nov	2.60	Nov	1.90	Nov	2.20
Dec	4.50	Dec	4.70	Dec	2.60	Dec	2.60	Dec	2.60	Dec	1.90	Dec	2.20
Jan 1983	4.70	Jan 1989	4.60	Jan 1995	2.90	Jan 2001	2.60	Jan 2007	2.70	Jan 2013	1.90	Jan 2019	2.20
Feb	4.70	Feb	4.80	Feb	3.00	Feb	2.70	Feb	2.70	Feb	2.00	Feb	2.10
Mar	4.70	Mar	4.70	Mar	3.00	Mar	2.70	Mar	2.50	Mar	1.90	Mar	2.00
Apr	4.30	Apr	4.60	Apr	3.10	Apr	2.60	Apr	2.30	Apr	1.70	Apr	2.10
May	3.60	May	4.60	May	3.10	May	2.50	May	2.20	May	1.70	May	2.00
Jun	2.90	Jun	4.50	Jun	3.00	Jun	2.70	Jun	2.20	Jun	1.60	Jun	2.10
Jul	3.00	Jul	4.60	Jul	3.00	Jul	2.70	Jul	2.20	Jul	1.70	Jul	2.20
Aug	3.00	Aug	4.40	Aug	2.90	Aug	2.70	Aug	2.10	Aug	1.80	Aug	2.40
Sep	3.50	Sep	4.30	Sep	2.90	Sep	2.60	Sep	2.10	Sept	1.70	Sept	2.40
Oct	3.70	Oct	4.30	Oct	3.00	Oct	2.60	Oct	2.20	Oct	1.70	Oct	2.30
Nov	4.30	Nov	4.40	Nov	3.00	Nov	2.80	Nov	2.30	Nov	1.70	Nov	2.30
Dec	4.80	Dec	4.40	Dec	3.00	Dec	2.70	Dec	2.40	Dec	1.70	Dec	2.30
Jan 1984	4.80	Jan 1990	4.40	Jan 1996	3.00	Jan 2002	2.60	Jan 2008	2.50	Jan 2014	1.60	Jan 2020	2.30
Feb	4.80	Feb	4.60	Feb	2.90	Feb	2.60	Feb	2.30	Feb	1.60	Feb	2.40
Mar	5.00	Mar	4.90	Mar	2.80	Mar	2.40	Mar	2.40	Mar	1.70	Mar	2.10
Apr	5.00	Apr	4.80	Apr	2.70	Apr	2.50	Apr	2.30	Apr	1.80	Apr	1.40
May	5.20	May	4.80	May	2.70	May	2.50	May	2.30	May	2.00	May	1.20
Jun	5.10	Jun	4.90	Jun	2.70	Jun	2.30	Jun	2.40	Jun	1.90	Jun	1.20
Jul	5.00	Jul	5.00	Jul	2.70	Jul	2.20	Jul	2.50	Jul	1.90	Jul	1.60
Aug	5.10	Aug	5.50	Aug	2.60	Aug	2.40	Aug	2.50	Aug	1.70	Aug	1.70
Sep	5.10	Sep	5.50	Sep	2.70	Sep	2.20	Sep	2.50	Sep	1.70	Sep	1.70
Oct	4.90	Oct	5.30	Oct	2.60	Oct	2.20	Oct	2.20	Oct	1.80	Oct	1.60
Nov	4.60	Nov	5.30	Nov	2.60	Nov	2.00	Nov	2.00	Nov	1.70	Nov	1.60
Dec	4.70	Dec	5.20	Dec	2.60	Dec	1.90	Dec	1.80	Dec	1.60	Dec	1.60
Jan 1985	4.50	Jan 1991	5.60	Jan 1997	2.50	Jan 2003	1.90	Jan 2009	1.70	Jan 2015	1.60	Jan 2021	1.40
Feb	4.70	Feb	5.60	Feb	2.50	Feb	1.70	Feb	1.80	Feb	1.70	Feb	1.30
Mar	4.80	Mar	5.20	Mar	2.50	Mar	1.70	Mar	1.80	Mar	1.80	Mar	1.60
Apr	4.50	Apr	5.10	Apr	2.70	Apr	1.50	Apr	1.90	Apr	1.80	Apr	3.00
May	4.50	May	5.10	May	2.50	May	1.60	May	1.80	May	1.70	May	3.80
Jun	4.40	Jun	5.00	Jun	2.40	Jun	1.50	Jun	1.70	Jun	1.80	Jun	4.50
Jul	4.20	Jul	4.80	Jul	2.40	Jul	1.50	Jul	1.50	Jul	1.80	Jul	4.30
Aug	4.10	Aug	4.60	Aug	2.30	Aug	1.30	Aug	1.40	Aug	1.80	Aug	4.00
Sep	4.00	Sep	4.50	Sep	2.20	Sep	1.20	Sep	1.50	Sep	1.90	Sep	4.00
Oct	4.10	Oct	4.40	Oct	2.30	Oct	1.30	Oct	1.70	Oct	1.90	Oct	4.60
Nov	4.40	Nov	4.50	Nov	2.20	Nov	1.10	Nov	1.70	Nov	2.00	Nov	4.90
Dec	4.30	Dec	4.40	Dec	2.20	Dec	1.10	Dec	1.80	Dec	2.10	Dec	5.50

Source: U.S. Dept. of Labor, Bureau of Labor Statistics, Consumer Price Index - All Urban Consumers less food and energy,
Change for 12-Month Period, Bureau of Labor Statistics,
https://www.bls.gov/cpi/data.htm

THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320



SCHEDULE SJW-3-2

THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320

Average Yields on Moody's Public Utility Bonds

Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1980	12.12	Jan 1986	10.66	Jan 1992	8.67	Jan 1998	7.03	Jan 2004	6.23	Jan 2010	5.83	Jan 2016	4.62
Feb	13.48	Feb	10.16	Feb	8.77	Feb	7.09	Feb	6.17	Feb	5.94	Feb	4.44
Mar	14.33	Mar	9.33	Mar	8.84	Mar	7.13	Mar	6.01	Mar	5.90	Mar	4.40
Apr	13.50	Apr	9.02	Apr	8.79	Apr	7.12	Apr	6.38	April	5.87	Apr	4.16
May	12.17	May	9.52	May	8.72	May	7.11	May	6.68	May	5.59	May	4.06
Jun	11.87	Jun	9.51	Jun	8.64	Jun	6.99	Jun	6.53	Jun	5.62	Jun	3.93
Jul	12.12	Jul	9.19	Jul	8.46	Jul	6.99	Jul	6.34	Jul	5.41	Jul	3.70
Aug	12.82	Aug	9.15	Aug	8.34	Aug	6.96	Aug	6.18	Aug	5.10	Aug	3.73
Sep	13.29	Sep	9.42	Sep	8.32	Sep	6.88	Sep	6.01	Sep	5.10	Sep	3.80
Oct	13.53	Oct	9.39	Oct	8.44	Oct	6.88	Oct	5.95	Oct	5.20	Oct	3.90
Nov	14.07	Nov	9.15	Nov	8.53	Nov	6.96	Nov	5.97	Nov	5.45	Nov	4.21
Dec	14.48	Dec	8.96	Dec	8.36	Dec	6.84	Dec	5.93	Dec	5.64	Dec	4.39
Jan 1981	14.22	Jan 1987	8.77	Jan 1993	8.23	Jan 1999	6.87	Jan 2005	5.80	Jan 2011	5.64	Jan 2017	4.24
Feb	14.84	Feb	8.81	Feb	8.00	Feb	7.00	Feb	5.64	Feb	5.73	Feb	4.25
Mar	14.86	Mar	8.75	Mar	7.85	Mar	7.18	Mar	5.86	Mar	5.62	Mar	4.30
Apr	15.32	Apr	9.30	Apr	7.76	Apr	7.16	Apr	5.72	Apr	5.62	Apr	4.19
May	15.84	May	9.82	May	7.78	May	7.42	May	5.60	May	5.38	May	4.19
Jun	15.27	Jun	9.87	Jun	7.68	Jun	7.70	Jun	5.39	Jun	5.32	Jun	4.01
Jul	15.87	Jul	10.01	Jul	7.53	Jul	7.66	Jul	5.50	Jul	5.34	July	4.06
Aug	16.33	Aug	10.33	Aug	7.21	Aug	7.86	Aug	5.51	Aug	4.78	Aug	3.92
Sep	16.89	Sep	11.00	Sep	7.01	Sep	7.87	Sep	5.54	Sep	4.61	Sep	3.93
Oct	16.76	Oct	11.32	Oct	6.99	Oct	8.02	Oct	5.79	Oct	4.66	Oct	3.97
Nov	15.50	Nov	10.82	Nov	7.30	Nov	7.86	Nov	5.88	Nov	4.37	Nov	3.88
Dec	15.77	Dec	10.99	Dec	7.33	Dec	8.04	Dec	5.83	Dec	4.47	Dec	3.85
Jan 1982	16.73	Jan 1988	10.75	Jan 1994	7.31	Jan 2000	8.22	Jan 2006	5.77	Jan 2012	4.48	Jan 2018	3.91
Feb	16.72	Feb	10.11	Feb	7.44	Feb	8.10	Feb	5.83	Feb	4.47	Feb	4.15
Mar	16.07	Mar	10.11	Mar	7.83	Mar	8.14	Mar	5.98	Mar	4.59	Mar	4.21
Apr	15.82	Apr	10.53	Apr	8.20	Apr	8.14	Apr	6.28	Apr	4.54	Apr	4.24
May	15.60	May	10.75	May	8.32	May	8.56	May	6.39	May	4.36	May	4.36
Jun	16.18	Jun	10.71	Jun	8.31	Jun	8.22	June	6.39	Jun	4.26	Jun	4.37
Jul	16.04	Jul	10.96	Jul	8.47	Jul	8.17	July	6.37	Jul	4.12	Jul	4.35
Aug	15.22	Aug	11.09	Aug	8.41	Aug	8.06	Aug	6.20	Aug	4.18	Aug	4.33
Sep	14.56	Sep	10.56	Sep	8.65	Sep	8.15	Sep	6.03	Sep	4.17	Sep	4.41
Oct	13.88	Oct	9.92	Oct	8.88	Oct	8.08	Oct	6.01	Oct	4.04	Oct	4.56
Nov	13.58	Nov	9.89	Nov	9.00	Nov	8.03	Nov	5.82	Nov	3.95	Nov	4.65
Dec	13.55	Dec	10.02	Dec	8.79	Dec	7.79	Dec	5.83	Dec	4.10	Dec	4.51
Jan 1983	13.46	Jan 1989	10.02	Jan 1995	8.77	Jan 2001	7.76	Jan 2007	5.96	Jan 2013	4.24	Jan 2019	4.48
Feb	13.60	Feb	10.02	Feb	8.56	Feb	7.69	Feb	5.91	Feb	4.29	Feb	4.35
Mar	13.28	Mar	10.16	Mar	8.41	Mar	7.59	Mar	5.87	Mar	4.29	Mar	4.26
Apr	13.03	Apr	10.14	Apr	8.30	Apr	7.81	Apr	6.01	Apr	4.08	Apr	4.18
May	13.00	May	9.92	May	7.93	May	7.88	May	6.03	May	4.24	May	4.10
Jun	13.17	Jun	9.49	Jun	7.62	Jun	7.75	Jun	6.34	Jun	4.63	Jun	3.93
Jul	13.28	Jul	9.34	Jul	7.73	Jul	7.71	Jul	6.28	Jul	4.78	Jul	3.79
Aug	13.50	Aug	9.37	Aug	7.86	Aug	7.57	Aug	6.28	Aug	4.85	Aug	3.36
Sep	13.35	Sep	9.43	Sep	7.62	Sep	7.73	Sep	6.24	Sept	4.90	Sept	3.44
Oct	13.19	Oct	9.37	Oct	7.46	Oct	7.64	Oct	6.17	Oct	4.78	Oct	3.45
Nov	13.33	Nov	9.33	Nov	7.40	Nov	7.61	Nov	6.04	Nov	4.86	Nov	3.48
Dec	13.48	Dec	9.31	Dec	7.21	Dec	7.86	Dec	6.23	Dec	4.88	Dec	3.45
Jan 1984	13.40	Jan 1990	9.44	Jan 1996	7.20	Jan 2002	7.69	Jan 2008	6.08	Jan 2014	4.72	Jan 2020	3.34
Feb	13.50	Feb	9.66	Feb	7.37	Feb	7.62	Feb	6.28	Feb	4.64	Feb	3.16
Mar	14.03	Mar	9.75	Mar	7.72	Mar	7.83	Mar	6.29	Mar	4.64	Mar	3.59
Apr	14.30	Apr	9.87	Apr	7.88	Apr	7.74	Apr	6.36	Apr	4.52	Apr	3.31
May	14.95	May	9.89	May	7.99	May	7.76	May	6.38	May	4.37	May	3.22
Jun	15.16	Jun	9.69	Jun	8.07	Jun	7.67	Jun	6.50	Jun	4.42	Jun	3.10
Jul	14.92	Jul	9.66	Jul	8.02	Jul	7.54	Jul	6.50	Jul	4.35	Jul	2.77
Aug	14.29	Aug	9.84	Aug	7.84	Aug	7.34	Aug	6.48	Aug	4.28	Aug	2.76
Sep	14.04	Sep	10.01	Sep	8.01	Sep	7.23	Sep	6.59	Sep	4.40	Sep	2.88
Oct	13.68	Oct	9.94	Oct	7.76	Oct	7.43	Oct	7.70	Oct	4.24	Oct	2.98
Nov	13.15	Nov	9.76	Nov	7.48	Nov	7.31	Nov	7.80	Nov	4.29	Nov	2.89
Dec	12.96	Dec	9.57	Dec	7.58	Dec	7.20	Dec	6.87	Dec	4.18	Dec	2.80
Jan 1985	12.88	Jan 1991	9.56	Jan 1997	7.79	Jan 2003	7.13	Jan 2009	6.77	Jan 2015	3.83	Jan 2021	2.94
Feb	13.00	Feb	9.31	Feb	7.68	Feb	6.92	Feb	6.72	Feb	3.91	Feb	3.13
Mar	13.66	Mar	9.39	Mar	7.92	Mar	6.80	Mar	6.85	Mar	3.97	Mar	3.48
Apr	13.42	Apr	9.30	Apr	8.08	Apr	6.68	Apr	6.90	Apr	3.96	Apr	3.33
May	12.89	May	9.29	May	7.94	May	6.35	May	6.83	May	4.38	May	3.36
Jun	11.91	Jun	9.44	Jun	7.77	Jun	6.21	Jun	6.54	Jun	4.60	Jun	3.19
Jul	11.88	Jul	9.40	Jul	7.52	Jul	6.54	Jul	6.15	Jul	4.63	Jul	2.99
Aug	11.93	Aug	9.16	Aug	7.57	Aug	6.78	Aug	5.80	Aug	4.54	Aug	2.99
Sep	11.95	Sep	9.03	Sep	7.50	Sep	6.58	Sep	5.60	Sep	4.68	Sep	3.00
Oct	11.84	Oct	8.99	Oct	7.37	Oct	6.50	Oct	5.64	Oct	4.63	Oct	3.13
Nov	11.33	Nov	8.93	Nov	7.24	Nov	6.44	Nov	5.71	Nov	4.73	Nov	3.06
Dec	10.82	Dec	8.76	Dec	7.16	Dec	6.35	Dec	5.86	Dec	4.69	Dec	3.08

Source:
https://fred.stlouisfed.org/series/DBAA

SCHEDULE SJW-4-1

Average Yields on Thirty-Year U.S. Treasury Bonds

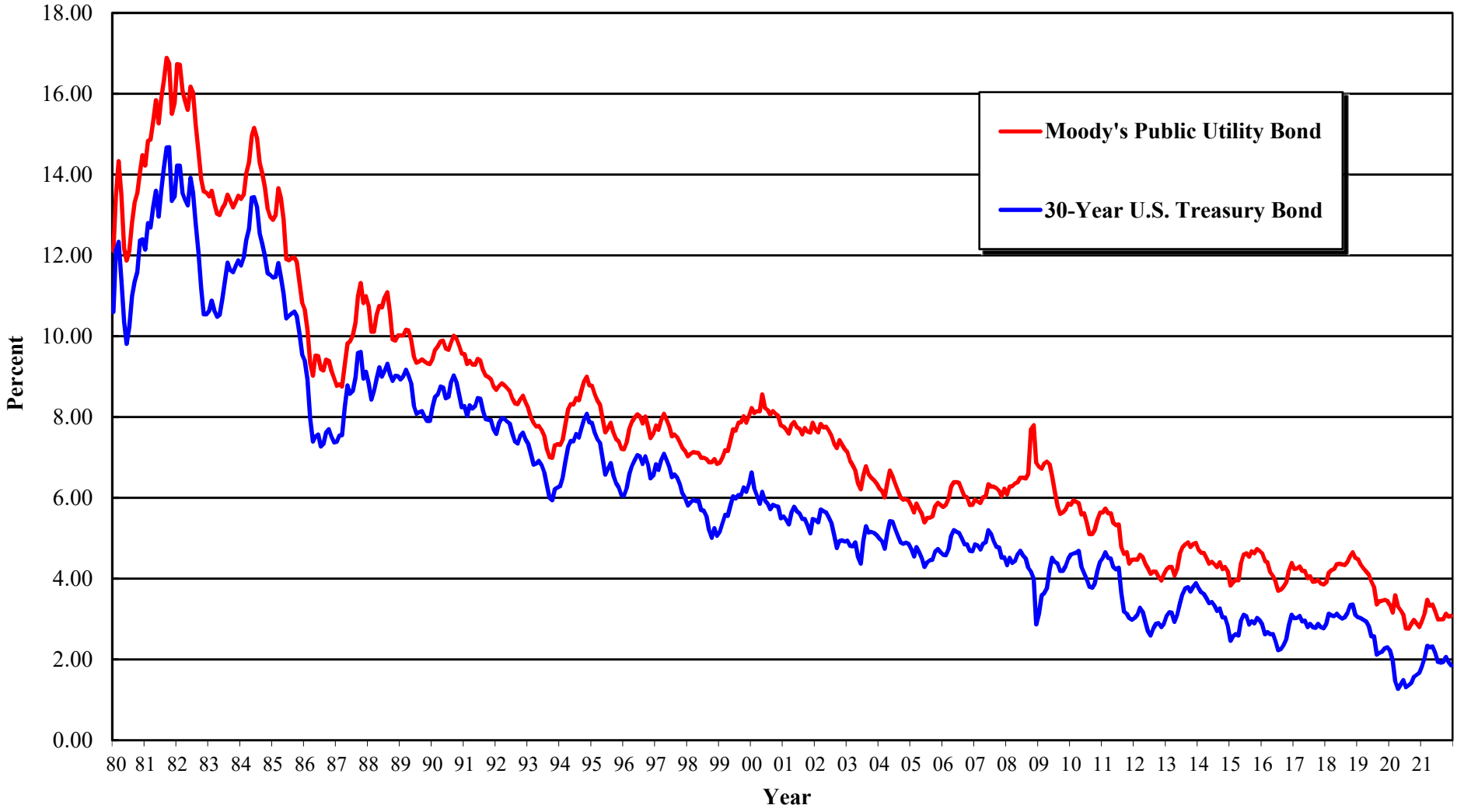
Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1980	10.60	Jan 1986	9.40	Jan 1992	7.58	Jan 1998	5.81	Jan 2004	4.99	Jan 2010	4.60	Jan 2016	2.86
Feb	12.13	Feb	8.93	Feb	7.85	Feb	5.89	Feb	4.93	Feb	4.62	Feb	2.62
Mar	12.34	Mar	7.96	Mar	7.97	Mar	5.95	Mar	4.74	Mar	4.64	Mar	2.68
Apr	11.40	Apr	7.39	Apr	7.96	Apr	5.92	Apr	5.14	April	4.69	Apr	2.62
May	10.36	May	7.52	May	7.89	May	5.93	May	5.42	May	4.29	May	2.63
Jun	9.81	Jun	7.57	Jun	7.84	Jun	5.70	Jun	5.41	Jun	4.13	Jun	2.45
Jul	10.24	Jul	7.27	Jul	7.60	Jul	5.68	Jul	5.22	Jul	3.99	Jul	2.23
Aug	11.00	Aug	7.33	Aug	7.39	Aug	5.54	Aug	5.06	Aug	3.80	Aug	2.26
Sep	11.34	Sep	7.62	Sep	7.34	Sep	5.20	Sep	4.90	Sep	3.77	Sep	2.35
Oct	11.59	Oct	7.70	Oct	7.53	Oct	5.01	Oct	4.86	Oct	3.87	Oct	2.50
Nov	12.37	Nov	7.52	Nov	7.61	Nov	5.25	Nov	4.89	Nov	4.19	Nov	2.86
Dec	12.40	Dec	7.37	Dec	7.44	Dec	5.06	Dec	4.86	Dec	4.42	Dec	3.11
Jan 1981	12.14	Jan 1987	7.39	Jan 1993	7.34	Jan 1999	5.16	Jan 2005	4.73	Jan 2011	4.52	Jan 2017	3.02
Feb	12.80	Feb	7.54	Feb	7.09	Feb	5.37	Feb	4.55	Feb	4.65	Feb	3.03
Mar	12.69	Mar	7.55	Mar	6.82	Mar	5.58	Mar	4.78	Mar	4.51	Mar	3.08
Apr	13.20	Apr	8.25	Apr	6.85	Apr	5.55	Apr	4.65	Apr	4.50	Apr	2.94
May	13.60	May	8.78	May	6.92	May	5.81	May	4.49	May	4.29	May	2.96
Jun	12.96	Jun	8.57	Jun	6.81	Jun	6.04	Jun	4.29	Jun	4.23	Jun	2.80
Jul	13.59	Jul	8.64	Jul	6.63	Jul	5.98	Jul	4.41	Jul	4.27	July	2.88
Aug	14.17	Aug	8.97	Aug	6.32	Aug	6.07	Aug	4.46	Aug	3.65	Aug	2.80
Sep	14.67	Sep	9.59	Sep	6.00	Sep	6.07	Sep	4.47	Sep	3.18	Sep	2.78
Oct	14.68	Oct	9.61	Oct	5.94	Oct	6.26	Oct	4.67	Oct	3.13	Oct	2.88
Nov	13.35	Nov	8.95	Nov	6.21	Nov	6.15	Nov	4.73	Nov	3.02	Nov	2.80
Dec	13.45	Dec	9.12	Dec	6.25	Dec	6.35	Dec	4.66	Dec	2.98	Dec	2.77
Jan 1982	14.22	Jan 1988	8.83	Jan 1994	6.29	Jan 2000	6.63	Jan 2006	4.59	Jan 2012	3.03	Jan 2018	2.88
Feb	14.22	Feb	8.43	Feb	6.49	Feb	6.23	Feb	4.58	Feb	3.11	Feb	3.13
Mar	13.53	Mar	8.63	Mar	6.91	Mar	6.05	Mar	4.73	Mar	3.28	Mar	3.09
Apr	13.37	Apr	8.95	Apr	7.27	Apr	5.85	Apr	5.06	Apr	3.18	Apr	3.07
May	13.24	May	9.23	May	7.41	May	6.15	May	5.20	May	2.93	May	3.13
Jun	13.92	Jun	9.00	Jun	7.40	Jun	5.93	June	5.16	Jun	2.70	Jun	3.05
Jul	13.55	Jul	9.14	Jul	7.58	Jul	5.85	July	5.13	Jul	2.59	Jul	3.01
Aug	12.77	Aug	9.32	Aug	7.49	Aug	5.72	Aug	5.00	Aug	2.77	Aug	3.04
Sep	12.07	Sep	9.06	Sep	7.71	Sep	5.83	Sep	4.85	Sep	2.88	Sep	3.15
Oct	11.17	Oct	8.89	Oct	7.94	Oct	5.80	Oct	4.85	Oct	2.90	Oct	3.34
Nov	10.54	Nov	9.02	Nov	8.08	Nov	5.78	Nov	4.69	Nov	2.80	Nov	3.36
Dec	10.54	Dec	9.01	Dec	7.87	Dec	5.49	Dec	4.68	Dec	2.88	Dec	3.10
Jan 1983	10.63	Jan 1989	8.93	Jan 1995	7.85	Jan 2001	5.54	Jan 2007	4.85	Jan 2013	3.08	Jan 2019	3.04
Feb	10.88	Feb	9.01	Feb	7.61	Feb	5.45	Feb	4.82	Feb	3.17	Feb	3.02
Mar	10.63	Mar	9.17	Mar	7.45	Mar	5.34	Mar	4.72	Mar	3.16	Mar	2.98
Apr	10.48	Apr	9.03	Apr	7.36	Apr	5.65	Apr	4.86	Apr	2.93	Apr	2.94
May	10.53	May	8.83	May	6.95	May	5.78	May	4.90	May	3.11	May	2.82
Jun	10.93	Jun	8.27	Jun	6.57	Jun	5.67	Jun	5.20	Jun	3.40	Jun	2.57
Jul	11.40	Jul	8.08	Jul	6.72	Jul	5.61	Jul	5.11	Jul	3.61	Jul	2.57
Aug	11.82	Aug	8.12	Aug	6.86	Aug	5.48	Aug	4.93	Aug	3.76	Aug	2.12
Sep	11.63	Sep	8.15	Sep	6.55	Sep	5.48	Sep	4.79	Sept	3.79	Sept	2.16
Oct	11.58	Oct	8.00	Oct	6.37	Oct	5.32	Oct	4.77	Oct	3.68	Oct	2.19
Nov	11.75	Nov	7.90	Nov	6.26	Nov	5.12	Nov	4.52	Nov	3.80	Nov	2.28
Dec	11.88	Dec	7.90	Dec	6.06	Dec	5.48	Dec	4.53	Dec	3.89	Dec	2.30
Jan 1984	11.75	Jan 1990	8.26	Jan 1996	6.05	Jan 2002	5.45	Jan 2008	4.33	Jan 2014	3.77	Jan 2020	2.22
Feb	11.95	Feb	8.50	Feb	6.24	Feb	5.39	Feb	4.52	Feb	3.66	Feb	1.97
Mar	12.38	Mar	8.56	Mar	6.60	Mar	5.71	Mar	4.39	Mar	3.62	Mar	1.46
Apr	12.65	Apr	8.76	Apr	6.79	Apr	5.67	Apr	4.44	Apr	3.52	Apr	1.27
May	13.43	May	8.73	May	6.93	May	5.64	May	4.60	May	3.39	May	1.38
Jun	13.44	Jun	8.46	Jun	7.06	Jun	5.52	Jun	4.69	Jun	3.42	Jun	1.49
Jul	13.21	Jul	8.50	Jul	7.03	Jul	5.38	Jul	4.57	Jul	3.33	Jul	1.31
Aug	12.54	Aug	8.86	Aug	6.84	Aug	5.08	Aug	4.50	Aug	3.20	Aug	1.36
Sep	12.29	Sep	9.03	Sep	7.03	Sep	4.76	Sep	4.27	Sep	3.26	Sep	1.42
Oct	11.98	Oct	8.86	Oct	6.81	Oct	4.93	Oct	4.17	Oct	3.04	Oct	1.57
Nov	11.56	Nov	8.54	Nov	6.48	Nov	4.95	Nov	4.00	Nov	3.04	Nov	1.62
Dec	11.52	Dec	8.24	Dec	6.55	Dec	4.92	Dec	2.87	Dec	2.83	Dec	1.67
Jan 1985	11.45	Jan 1991	8.27	Jan 1997	6.83	Jan 2003	4.94	Jan 2009	3.13	Jan 2015	2.46	Jan 2021	1.82
Feb	11.47	Feb	8.03	Feb	6.69	Feb	4.81	Feb	3.59	Feb	2.57	Feb	2.04
Mar	11.81	Mar	8.29	Mar	6.93	Mar	4.80	Mar	3.64	Mar	2.63	Mar	2.34
Apr	11.47	Apr	8.21	Apr	7.09	Apr	4.90	Apr	3.76	Apr	2.59	Apr	2.30
May	11.05	May	8.27	May	6.94	May	4.53	May	4.23	May	2.96	May	2.32
Jun	10.44	Jun	8.47	Jun	6.77	Jun	4.37	Jun	4.52	Jun	3.11	Jun	2.16
Jul	10.50	Jul	8.45	Jul	6.51	Jul	4.93	Jul	4.41	Jul	3.07	Jul	1.94
Aug	10.56	Aug	8.14	Aug	6.58	Aug	5.30	Aug	4.37	Aug	2.86	Aug	1.92
Sep	10.61	Sep	7.95	Sep	6.50	Sep	5.14	Sep	4.19	Sep	2.95	Sep	1.94
Oct	10.50	Oct	7.93	Oct	6.33	Oct	5.16	Oct	4.19	Oct	2.89	Oct	2.06
Nov	10.06	Nov	7.92	Nov	6.11	Nov	5.13	Nov	4.31	Nov	3.03	Nov	1.94
Dec	9.54	Dec	7.70	Dec	5.99	Dec	5.08	Dec	4.49	Dec	2.97	Dec	1.85

Source:

http://research.stlouisfed.org/fred2/data/GS30.txt

THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320

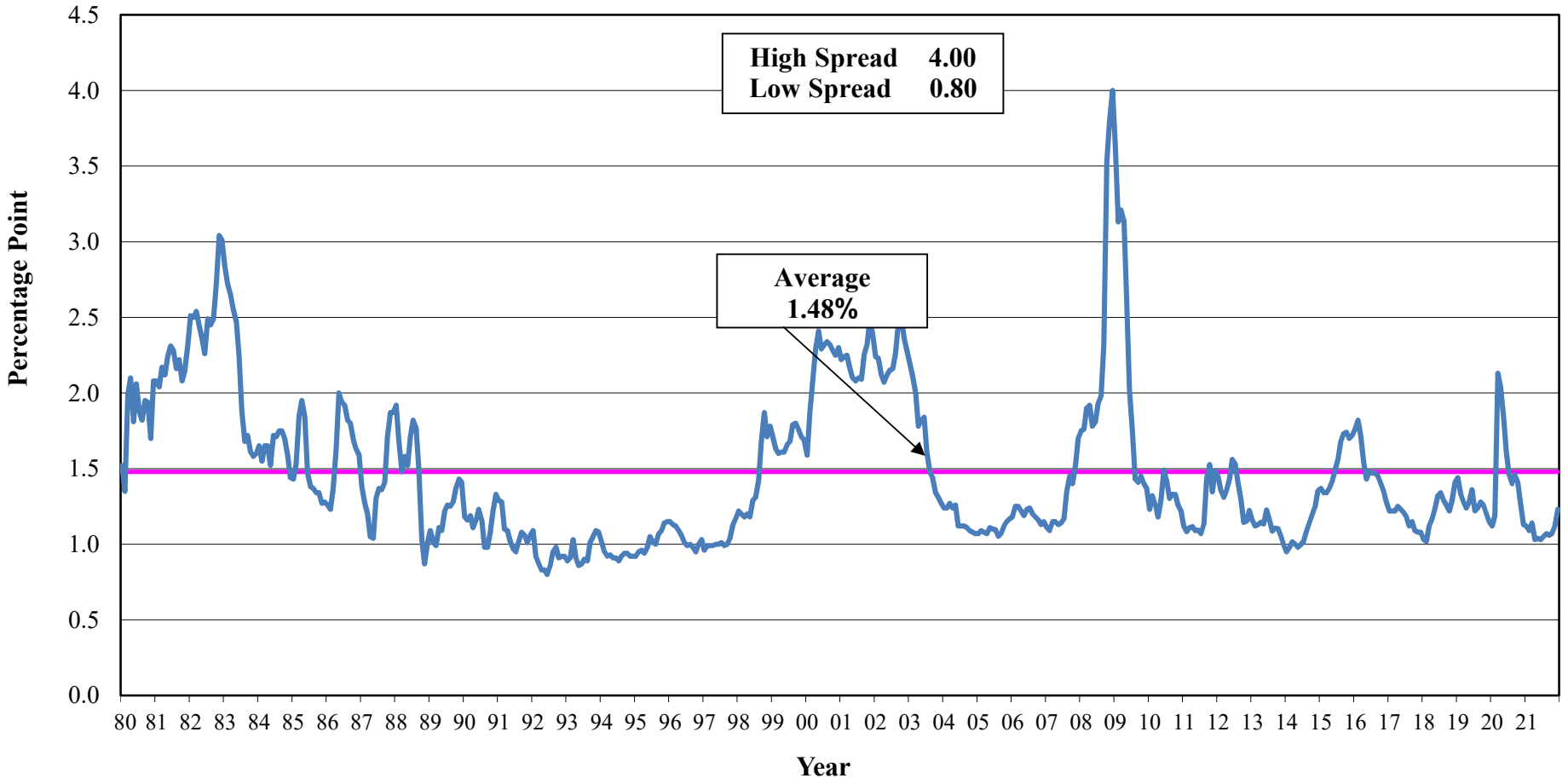
Average Yields on Mergent's Public Utility Bonds and Thirty-Year U.S. Treasury Bonds (1980 - 2021)



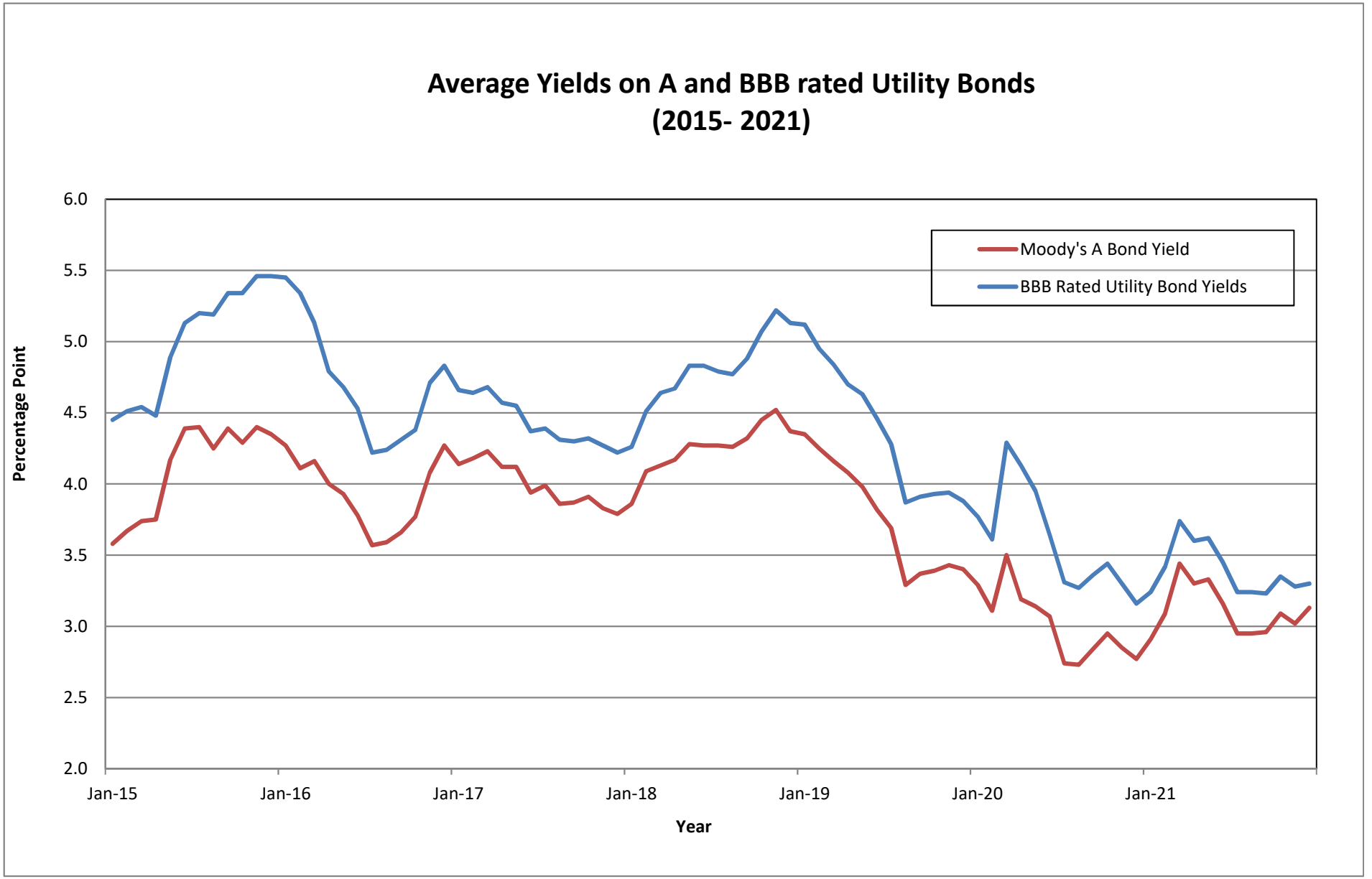
SCHEDULE SJW-4-3

THE EMPIRE DISTRICT GAS COMPANY
Case No. GR-2021-0320

Monthly Spreads Between Yields on Moody's Public Utility Bonds and 30-Year U.S. Treasury Bonds (1980 - 2021)



SCHEDULE SJW-4-4


Average Yields on A and BBB rated Utility Bonds
(2015- 2021)
Moody's A Bond Yield
BBB Rated Utility Bond Yields
Percentage Point
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Year

SCHEDULE SJW-5-1

SCHEDULE SJW-5-2

SCHEDULE SJW-6-1

SCHEDULE SJW-6-2

SCHEDULE SJW-7

SCHEDULE SJW-8

HAVE BEEN DEEMED

CONFIDENTIAL

IN THEIR ENTIRETY

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

PROXY GROUP SCREENING DATA AND RESULTS

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	
Gas Utility Companies	Ticker	Stock Publicly Traded	Information Provided by Value Line	Information Provided by Reuters	5-Year Data Available	Dividends	At Least Investment Grade Credit Rating	S&P Global Rating	Moody's	At least 65% of Regulated Income from Gas Utility Operations	At least 65% of Assets are Gas Distribution Operations	No Reduced Dividend Since 2015	Positive Growth Rates from at Least Two Sources	Covered by More Than 2 Analyst	Comparable Company Met All Criteria
Atmos Energy Corporation	ATO	Yes	Yes	Yes	Yes	Yes	Yes	A-	A1	Yes	Yes	Yes	Yes	Yes	Yes
Chesapeake Util.	CPK	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/A	No	No	Yes	Yes	Yes	No
New Jersey Resources Corporation	NJR	Yes	Yes	Yes	Yes	Yes	Yes	N/A	A1	Yes	Yes	Yes	Yes	Yes	Yes
NiSource Inc.	NI	Yes	Yes	Yes	Yes	Yes	Yes	BBB+	Baa2	No	No	No	Yes	Yes	No
Northwest Natural Holding Company	NWN	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Baa1	Yes	Yes	Yes	Yes	Yes	Yes
ONE Gas, Inc.	OGS	Yes	Yes	Yes	Yes	Yes	Yes	BBB+	A3	Yes	Yes	Yes	Yes	Yes	Yes
South Jersey Industries, Inc.	SJI	Yes	Yes	Yes	Yes	Yes	Yes	BBB	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Southwest Gas Holdings, Inc.	SWX	Yes	Yes	Yes	Yes	Yes	Yes	BBB+	Baa2	Yes	Yes	Yes	Yes	Yes	Yes
Spire Inc.	SR	Yes	Yes	Yes	Yes	Yes	Yes	A-	Baa2	Yes	Yes	Yes	Yes	Yes	Yes

Note:

[1] Source: The Value Line Investment Survey: Ratings & Reports
[2] Source: The Value Line Investment Survey: Ratings & Reports
[3] Source: Reuters, https://www.reuters.com/
[4] Source: The Value Line Investment Survey: Ratings & Reports
[5] Source: The Value Line Investment Survey: Ratings & Reports
[6] Source: S&P Global Market Intelligence
[7] Source: S&P Global Market Intelligence
[8] Source: S&P Global Market Intelligence
[9] Source: SEC Form 10-K Filings
[10] Source: SEC Form 10-K Filings
[11] Source: The Value Line Investment Survey: Ratings & Reports
[12] Source: S&P Global Market Intelligence, Value Line Investment Survey, Yahoo! Finance, and Zacks
[13] Source: S&P Global Market Intelligence, Value Line Investment Survey, Yahoo! Finance, and Zacks

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

PROXY GROUP LIST

	Gas Utility Companies	Ticker
1	Atmos Energy Corporation	ATO
2	New Jersey Resources Corporation	NJR
3	Northwest Natural Holding Company	NWN
4	ONE Gas, Inc.	OGS
5	South Jersey Industries, Inc.	SJI
6	Southwest Gas Holdings, Inc.	SWX
7	Spire Inc.	SR

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

Growth Rate Estimates
Based on Dividend per Share (DPS) and Earning per Share (EPS)
for the Comparable Natural Gas Utility Companies

			[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
2021 Q4			Past 10-Years			Past 5-Year			Projected EPS				Average		Projective
	Gas Utility Companies	Ticker	EPS	DPS	BVPS	EPS	DPS	BVPS	Value Line	S&P GMI	Zacks	P. EPS	H. DPS	H. BVPS	Nominal GDP
1	Atmos Energy Corporation	ATO	8.00%	5.00%	7.50%	9.00%	7.50%	10.00%	7.00%	7.51%	7.30%	7.27%	6.25%	8.75%	3.70%
2	New Jersey Resources Corporation	NJR	6.00%	7.00%	7.50%	5.50%	6.50%	8.50%	1.50%	7.10%	7.10%	5.23%	6.75%	8.00%	3.70%
3	Northwest Natural Holding Company	NWN	-1.50%	1.50%	1.00%	1.50%	0.50%		5.50%	5.03%	5.03%	5.19%	1.00%	1.00%	3.70%
4	ONE Gas, Inc.	OGS				10.00%	14.50%	3.00%	6.50%	5.33%	5.00%	5.61%	14.50%	3.00%	3.70%
5	South Jersey Industries, Inc.	SJI	1.50%	6.50%	5.50%	-1.50%	4.00%	2.50%	11.50%	4.84%	5.63%	7.32%	5.25%	4.00%	3.70%
6	Southwest Gas Holdings, Inc.	SWX	7.50%	8.50%	6.00%	5.50%	8.00%	7.00%	9.50%	5.23%	5.50%	6.74%	8.25%	6.50%	3.70%
7	Spire Inc.	SR	1.50%	4.50%	7.00%	4.50%	6.00%	5.50%	10.00%	6.04%	5.30%	7.11%	5.25%	6.25%	3.70%
	Average		3.83%	5.50%	5.75%	4.93%	6.71%	6.08%	7.36%	5.87%	5.84%	6.35%	6.75%	5.36%	3.70%

2021 Q1			Past 10-Years			Past 5-Year			Projected EPS				Average		Projective
	Gas Utility Companies	Ticker	EPS	DPS	BVPS	EPS	DPS	BVPS	Value Line	S&P GMI	Zacks	P. EPS	H. DPS	H. BVPS	Nominal GDP
1	Atmos Energy Corporation	ATO	8.00%	5.00%	7.50%	9.00%	7.50%	10.00%	7.00%	6.56%	7.10%	6.89%	6.25%	8.75%	3.80%
2	New Jersey Resources Corporation	NJR	7.00%	7.00%	7.50%	6.00%	6.50%	8.50%	1.50%	10.05%	7.10%	6.22%	6.75%	8.00%	3.80%
3	Northwest Natural Holding Company	NWN	-11.00%	2.00%	1.00%	-17.50%	0.50%	-0.50%	5.50%	2.46%	3.10%	3.69%	1.25%	0.25%	3.80%
4	ONE Gas, Inc.	OGS				9.50%	17.00%	2.50%	6.50%	5.50%	6.00%	6.00%	17.00%	2.50%	3.80%
5	South Jersey Industries, Inc.	SJI	1.50%	7.50%	5.50%	-4.00%	5.00%	3.50%	10.50%	4.49%	24.50%	13.16%	6.25%	4.50%	3.80%
6	Southwest Gas Holdings, Inc.	SWX	8.00%	8.50%	6.00%	4.50%	9.50%	6.50%	8.00%	5.17%	5.00%	6.06%	9.00%	6.25%	3.80%
7	Spire Inc.	SR	1.50%	4.50%	7.00%	4.50%	6.00%	5.50%	9.00%	12.56%	16.50%	12.69%	5.25%	6.25%	3.80%
	Average		2.50%	5.75%	5.75%	1.71%	7.43%	5.14%	6.86%	6.68%	9.90%	7.81%	7.39%	5.21%	3.80%

Note:

[1] Source: The Value Line Investment Survey
[2] Source: The Value Line Investment Survey
[3] Source: The Value Line Investment Survey
[4] Source: The Value Line Investment Survey
[5] Source: The Value Line Investment Survey
[6] Source: The Value Line Investment Survey
[7] Source: The Value Line Investment Survey
[8] Source: S&P Capital IQ
[9] Source: Zacks
[10] =([7]+[8]+[9])/3
[11] =([2]+[5])/2
[12] =([3]+[6])/2
[13] Source: Congress Budget Office (CBO), Budget Economic Outlook

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

Average High / Low Stock Price
for the Comparable Natural Gas Utility Companies

	2021 Q4		[1]	[2]	[3]	[4]	[5]	[6]	[7]
			October 2021		November 2021		December 2021		
	Company Name	Ticker	High Stock Price	Low Stock Price	High Stock Price	Low Stock Price	High Stock Price	Low Stock Price	Average High/Low Stock Price (10/01/21 - 12/31/21)
1	Atmos Energy Corporation	ATO	92.54	90.82	94.78	93.15	99.13	97.24	94.61
2	New Jersey Resources Corporation	NJR	37.78	37.02	38.87	38.05	40.31	39.50	38.59
3	Northwest Natural Holding Company	NWN	47.26	46.36	46.17	45.14	47.54	46.58	46.51
4	ONE Gas, Inc.	OGS	68.21	66.82	68.77	67.24	73.56	72.03	69.44
5	South Jersey Industries, Inc.	SJI	22.66	22.11	24.02	23.44	25.28	24.78	23.72
6	Southwest Gas Holdings, Inc.	SWX	68.73	66.39	70.57	68.91	70.29	68.45	68.89
7	Spire Inc.	SR	64.50	63.15	63.10	61.60	64.00	62.74	63.18

	2021 Q1								
			January 2021		February 2021		March 2021		
	Company Name	Ticker	High Stock Price	Low Stock Price	High Stock Price	Low Stock Price	High Stock Price	Low Stock Price	Average High/Low Stock Price (1/01/21 - 3/31/21)
1	Atmos Energy Corporation	ATO	91.28	89.09	90.93	88.97	93.60	91.55	90.90
2	New Jersey Resources Corporation	NJR	36.33	35.18	38.14	37.21	41.06	39.79	37.95
3	Northwest Natural Holding Company	NWN	45.13	43.40	47.62	46.24	52.61	50.69	47.61
4	ONE Gas, Inc.	OGS	73.88	71.86	73.13	71.25	74.74	72.65	72.92
5	South Jersey Industries, Inc.	SJI	22.37	21.51	24.13	23.44	25.54	24.43	23.57
6	Southwest Gas Holdings, Inc.	SWX	60.26	58.67	63.54	61.83	68.05	65.89	63.04
7	Spire Inc.	SR	62.54	60.83	65.95	64.27	73.00	70.99	66.26

Note:

[1] Source: Wall Street Journal, https://www.wsj.com/market-data

[2] Source: Wall Street Journal, https://www.wsj.com/market-data

[3] Source: Wall Street Journal, https://www.wsj.com/market-data

[4] Source: Wall Street Journal, https://www.wsj.com/market-data

[5] Source: Wall Street Journal, https://www.wsj.com/market-data

[6] Source: Wall Street Journal, https://www.wsj.com/market-data

[7] = ([1]+[2]+[3]+[4]+[5]+[6]) / 6

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

Discounted Cash Flow (DCF) Costs of Common Equity (COE) Estimates
Based on Dividend per Share, Earning per Share, Stock Price, and Growth Rate
for the Comparable Natural Gas Utility Companies

2021 Q4 DCF COE estimate		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Gas Utility Companies	Ticker	Dividend per Share	Stock Price	Dividend Yield	Expected Dividend Yield	Projected Weighted Growth	Projected GDP Growth	Growth Rate	COE
1 Atmos Energy Corporation	ATO	2.30	94.61	2.43%	2.51%	7.27%	3.70%	6.56%	9.07%
2 New Jersey Resources Corporation	NJR	1.27	38.59	3.29%	3.37%	5.23%	3.70%	4.93%	8.30%
3 Northwest Natural Holding Company	NWN	1.91	46.51	4.11%	4.21%	5.19%	3.70%	4.89%	9.10%
4 ONE Gas, Inc.	OGS	2.16	69.44	3.11%	3.19%	5.61%	3.70%	5.23%	8.42%
5 South Jersey Industries, Inc.	SJI	1.19	23.72	5.02%	5.18%	7.32%	3.70%	6.60%	11.78%
6 Southwest Gas Holdings, Inc.	SWX	2.28	68.89	3.31%	3.41%	6.74%	3.70%	6.14%	9.55%
7 Spire Inc.	SR	2.49	63.18	3.94%	4.07%	7.11%	3.70%	6.43%	10.50%
Average		1.94	57.85	3.60%	3.71%	6.35%	3.70%	5.82%	9.53%
								DCF Lower Bound	9.08%
								DCF Upper Bound	9.32%
								Average	9.20%

2021 Q1 DCF COE estimate		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Gas Utility Companies	Ticker	Dividend per Share	Stock Price	Dividend Yield	Expected Dividend Yield	Projected Weighted Growth	Projected GDP Growth	Growth Rate	COE
1 Atmos Energy Corporation	ATO	2.30	90.90	2.53%	2.61%	6.89%	3.80%	6.27%	8.88%
2 New Jersey Resources Corporation	NJR	1.27	37.95	3.35%	3.44%	6.22%	3.80%	5.73%	9.18%
3 Northwest Natural Holding Company	NWN	1.91	47.61	4.01%	4.09%	3.69%	3.80%	3.71%	7.80%
4 ONE Gas, Inc.	OGS	2.16	72.92	2.96%	3.04%	6.00%	3.80%	5.56%	8.60%
5 South Jersey Industries, Inc.	SJI	1.19	23.57	5.05%	5.33%	13.16%	3.80%	11.29%	16.62%
6 Southwest Gas Holdings, Inc.	SWX	2.28	63.04	3.62%	3.72%	6.06%	3.80%	5.60%	9.32%
7 Spire Inc.	SR	2.49	66.26	3.76%	3.96%	12.69%	3.80%	10.91%	14.87%
Average		1.94	57.47	3.61%	3.74%	7.81%	3.80%	7.01%	10.75%
								DCF Lower Bound	9.03%
								DCF Upper Bound	9.25%
								Average	9.14%

Comparison DCF Estimates

2021 Q1 DCF COE estimate	9.14%
2021 Q4 DCF COE estimate	9.20%
Difference of Averages between Q1 2021 and Q4 2021	0.06%

Note:

[1] Source: The Value Line Investment Survey: Ratings & Reports.

[2] Source: The Wall Street Journal; Average Monthly Highest and Lowest.

[3] = [1] / [2]

[4] = [3] x (1 + .5 x [7])

[5] Source: [12] of Growth Rate SJW-11

[6] Source: Congress Budget Office (CBO), Budget Economic Outlook

[7] = (4 x [5] + [6]) / 5

[8] = [4] + [7]

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

Capital Asset Pricing Model (CAPM) Costs of Common Equity (COE) Estimates
Based on Historical Return Differences Between Common Stocks and Long-Term U.S. Treasuries
for the Comparable Natural Gas Utility Companies

2021 Q4 CAPM Estimate

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]
			Duff&Phelps (1926-2020)				NYU Stern (1928-2020)				Market Risk Premium				CAPM Cost of Common Equity			
			Large Company Stocks		Long-term G-Bonds		S&P 500		US Treasury Bond		Duff&Phelps		NYU Stern		Duff&Phelps		NYU Stern	
	Risk-Free		Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic
Gas Utility Companies	Rate	Beta	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return
1 Atmos Energy Corporation	1.95%	0.80	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	5.66%	6.81%	5.83%	7.09%
2 New Jersey Resources Corporation	1.95%	1.00	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.58%	8.02%	6.79%	8.38%
3 Northwest Natural Holding Company	1.95%	0.85	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	5.89%	7.11%	6.07%	7.41%
4 ONE Gas, Inc.	1.95%	0.80	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	5.66%	6.81%	5.83%	7.09%
5 South Jersey Industries, Inc.	1.95%	1.05	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.81%	8.33%	7.04%	8.70%
6 Southwest Gas Holdings, Inc.	1.95%	0.95	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.35%	7.72%	6.55%	8.06%
7 Spire Inc.	1.95%	0.85	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	5.89%	7.11%	6.07%	7.41%
Average	1.95%	0.90	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.12%	7.42%	6.31%	7.74%
																CAPM Lower Bound		5.71%
																CAPM Upper Bound		8.47%
																Average		7.09%

2021 Q1 CAPM Estimate

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]
			Duff&Phelps (1926-2020)				NYU Stern (1928-2020)				Market Risk Premium				CAPM Cost of Common Equity			
			Large Company Stocks		Long-term G-Bonds		S&P 500		US Treasury Bond		Duff&Phelps		NYU Stern		Duff&Phelps		NYU Stern	
	Risk-Free		Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic
Gas Utility Companies	Rate	Beta	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return	Mean Return
Atmos Energy Corporation	2.07%	0.80	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	5.78%	6.93%	5.95%	7.21%
New Jersey Resources Corporation	2.07%	0.95	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.47%	7.84%	6.67%	8.18%
Northwest Natural Holding Company	2.07%	0.90	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.24%	7.54%	6.43%	7.86%
ONE Gas, Inc.	2.07%	0.80	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	5.78%	6.93%	5.95%	7.21%
South Jersey Industries, Inc.	2.07%	1.05	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.93%	8.45%	7.16%	8.82%
Southwest Gas Holdings, Inc.	2.07%	0.95	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.47%	7.84%	6.67%	8.18%
Spire Inc.	2.07%	0.85	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.01%	7.23%	6.19%	7.53%
Average	2.07%	0.90	10.29%	12.16%	5.65%	6.08%	9.79%	11.64%	4.95%	5.21%	4.63%	6.07%	4.84%	6.43%	6.24%	7.54%	6.43%	7.86%
																CAPM Lower Bound		5.83%
																CAPM Upper Bound		8.48%
																Average		7.16%

Comparison DCF Estimates

Average MRP	5.49%
2021 Q1 CAPM COE estimate	7.16%
2021 Q4 CAPM COE estimate	7.09%
Difference of Averages between 2021 Q1 and 2021 Q4	-0.07%

Note:

[1] Source: 3-Month Average of 30-Year Treasury Bond
[2] Source: Value Line, Investment Survey.
[3] Source: Duff & Phelps, the Stocks, Bonds, Bills, and Inflation (SBBI®) Monthly Dataset.
[4] Source: Duff & Phelps, the Stocks, Bonds, Bills, and Inflation (SBBI®) Monthly Dataset.
[5] Source: Duff & Phelps, the Stocks, Bonds, Bills, and Inflation (SBBI®) Monthly Dataset.
[6] Source: Duff & Phelps, the Stocks, Bonds, Bills, and Inflation (SBBI®) Monthly Dataset.
[7] Source: Risk Premium, Damodaran Online, Stern School of Business, NYU.
[8] Source: Risk Premium, Damodaran Online, Stern School of Business, NYU.
[9] Source: Risk Premium, Damodaran Online, Stern School of Business, NYU.
[10] Source: Risk Premium, Damodaran Online, Stern School of Business, NYU.
[11] = [3] - [5]
[12] = [4] - [6]
[13] = [7] - [9]
[14] = [8] - [10]
[15] = [1] + [2] x [11]
[16] = [1] + [2] x [12]
[17] = [1] + [2] x [13]
[18] = [1] + [2] x [14]
a The Lower Bond of reasonable COE range

SCHEDULE SJW-14

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

AUTHORIZED RETURN ON EQUITY

		COE	DCF	CAPM
2021 Q4 Estimate			9.20% [A]	
				7.09% [B]
Average		8.14% [C]		
2021 Q1 Estimate			9.14% [D]	
				7.16% [E]
Average		8.15% [F]		
ROE Adjustment		-0.01% [G]	0.06% [H]	-0.07% [I]
Last Authorized ROE	2021 Q1	9.37% [J]		
Estimated ROE	2021 Q4	9.36% [K]	9.43% [L]	9.30% [M]

Note:

[A] Schedule SJW-13
[B] Schedule SJW-14
[C] = ([A] + [B]) / 2
[D] Schedule SJW-13
[E] Schedule SJW-14
[F] = ([D] + [E]) / 2
[G] = [C] - [F]
[H] = [A] - [D]
[I] = [B] - [E]
[J] Spire Missouri rate Case No. GR-2021-0108
[K] = [G] + [J]
[L] = [H] + [J]
[M] = [I] + [J]

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

ALLOWED RATE OF RETURN

				Allowed Rate of Return Common Equity Return of:	
	Percentage	Embedded	Lower	ROE	Upper
Capital Component	of Capital	Cost	**9.25%**	**9.50%**	**9.75%**
Common Stock Equity	53.84%	-	4.98%	5.11%	5.25%
Preferred Stock	0.00%	0.00%	0.00%	0.00%	0.00%
Long-Term Debt	46.16%	3.76% [1]	1.74%	1.74%	1.74%
Total	**100.00%**		**6.72%**	**6.85%**	**6.99%**

Note:

Staff's COS Report

1 Schedule SJW-7

THE EMPIRE DISTRICT GAS COMPANY
CASE NO. GR-2021-0320

Authorized ROE of the U.S Utility by Sector
2010-2021

	Natural Gas						Electric					
	Fully Litigated		Settled		Natural Gas Total		Fully Litigated		Settled		Electric Total	
Year	ROE (%)	Case (No.)	ROE (%)	Case (No.)	ROE (%)	Case (No.)	ROE (%)	Case (No.)	ROE (%)	Case (No.)	ROE (%)	Case (No.)
2010	10.08	27	10.30	12	10.15	39	10.35	27	10.39	34	10.37	61
2011	9.76	8	10.08	8	9.92	16	10.39	26	10.12	16	10.29	42
2012	9.92	21	9.99	14	9.94	35	10.28	29	10.06	29	10.17	58
2013	9.59	12	9.80	9	9.68	21	9.85	17	10.12	32	10.03	49
2014	9.98	15	9.51	11	9.78	26	10.05	21	9.73	17	9.91	38
2015	9.58	5	9.60	11	9.60	16	9.66	16	10.04	15	9.84	31
2016	9.61	10	9.50	16	9.54	26	9.74	25	9.80	17	9.77	42
2017	9.82	7	9.68	17	9.72	24	9.73	24	9.75	29	9.74	53
2018	9.59	17	9.59	23	9.59	40	9.63	22	9.57	26	9.60	48
2019	9.74	12	9.70	20	9.71	32	9.58	27	9.76	20	9.66	47
2020	9.44	12	9.47	22	9.46	34	9.43	32	9.46	23	9.44	55
2021	9.66	12	9.52	27	9.57	39	9.28	27	9.58	24	9.42	51

Note:

Source: S&P Global Market Intelligence, Retrieved in January 2, 2022

SCHEDULE SJW-17