

MISSOURI PUBLIC SERVICE COMMISSION

STAFF REPORT

COST OF SERVICE

APPENDIX 1

Staff Credentials

**UNION ELECTRIC COMPANY,
d/b/a Ameren Missouri**

CASE NO. ER-2019-0335

*Jefferson City, Missouri
December 2019*

Staff Exhibit No. 102
Date *3/4/20* Reporter *JMB*
File No. *ER-2019-0335*

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APPENDIX 1

STAFF CREDENTIALS

for Ameren Missouri

Case No. ER-2019-0335

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Paul Amenthor

EDUCATIONAL BACKGROUND AND EXPERIENCE

In December of 2016, I graduated from Southern Illinois University Edwardsville with a Bachelor of Science in Accounting. I have also earned a Bachelor of Science in Economic and Management with an emphasis in Accounting Sciences from the University of Lomé, Togo in June of 2007.

I commenced employment with the Missouri Public Service Commission as Utility Regulatory Auditor in September 2017. As a Utility Regulatory Auditor II, I am responsible in part, for assisting with the audit and examination of the books and records of utility companies operating within the State of Missouri and sponsoring testimony as an expert witness in Commission proceedings.

Prior to employment with the Commission, I worked with Walmart from June 2011 to August 2017, as an Inventory Management Associate. In this position, I was primarily responsible for ensuring the accuracy of on-hand inventory in the warehouse.

I also worked with Lee Enterprises (Lee Finance) from March 2017 to August 2017 as a Circulation Accounting Clerk. In this position, I was primarily responsible for processing customers' remittances, invoices, and accounts deposits. I also provided support for senior staff with each end of month closing.

Paul Amenthor

CASE PARTICIPATION

<u>Company Name</u>	<u>Case No.</u>	<u>Issues</u>
Ameren Missouri (Electric)	ER-2019-0335	Payroll & Related Payroll Taxes Employee Benefits, Employee Relocation Expenses MEEIA Test Year Labor and Non- Labor Expenses Callaway Refueling OT Labor and non-Labor Real & Property Taxes Non-Labor Power Plant maintenance Dues & Donations Miscellaneous Expenses Severance costs
Ameren Missouri (Electric)	EA-2019-0371	CCN Filing
Ameren Missouri (Gas)	GR-2019-0077	Rate Base Items: Prepayments, customer advances, customer deposits, Plant in service, Accumulated Reserve, natural gas inventories, materials and supplies Revenues: Customer Growth/seasonality, Removal of GRT, PGA, Unbilled Revenue, Provision for Rate Refunds, and Other Revenues Expenses: Uncollectible Expense, Capitalized depreciation, Non Labor Distribution Maintenance, and Interest on Customer Deposits Filed Direct, Surrebuttal/True-Up
Liberty Midstates Natural Gas (MNG)	GR-2018-0013	Advertising, Miscellaneous expenses, Insurance expense, regulatory expense, Environmental expense, Dues and Donations Filed Direct, Surrebuttal/True-Up

ALAN J. BAX

I graduated from the University of Missouri - Columbia with a Bachelor of Science degree in Electrical Engineering in December 1995. Concurrent with my studies, I was employed as an Engineering Assistant in the Energy Management Department of the University of Missouri – Columbia from the Fall of 1992 through the Fall of 1995. Prior to this, I completed a tour of duty in the United States Navy, completing a course of study at the Navy Nuclear Power School and a Navy Nuclear Propulsion Plant. Following my graduation from the University of Missouri - Columbia, I was employed by The Empire District Electric Company as a Staff Engineer until August 1999, at which time I began my employment with the Staff of the Missouri Public Service Commission. My current position is a Utility Engineering Specialist III in the Engineering Analysis Unit, within the Industry Analysis Division. I am a member of the Institute of Electrical/Electronic Engineers (IEEE).

TESTIMONY AND REPORTS
BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION

BY ALAN J. BAX

COMPANY	CASE NUMBER
Aquila Networks – MPS	ER-2004-0034
Union Electric Company d/b/a AmerenUE	EO-2004-0108
Empire District Electric Company	ER-2002-0424
Kansas City Power and Light Company	EA-2003-0135
Union Electric Company d/b/a AmerenUE	EO-2003-0271
Aquila Networks – MPS	EO-2004-0603
Union Electric Company d/b/a AmerenUE	EC-2002-0117
Three Rivers and Gascosage Electric Coops	EO-2005-0122
Union Electric Company d/b/a AmerenUE	EC-2002-1
Aquila Networks – MPS	EO-2001-0384
Empire District Electric Company	ER-2001-299
Aquila Networks – MPS	EA-2003-0370
Union Electric Company d/b/a AmerenUE	EW-2004-0583
Union Electric Company d/b/a AmerenUE	EO-2005-0369
Trigen Kansas City	HA-2006-0294
Union Electric Company d/b/a AmerenUE	EC-2005-0352
Missouri Public Service	ER-2001-672
Aquila Networks – MPS	EO-2003-0543
Kansas City Power and Light Company	ER-2006-0314
Macon Electric Coop	EO-2005-0076
Aquila Networks – MPS	EO-2006-0244
Union Electric Company d/b/a AmerenUE	EC-2004-0556
Union Electric Company d/b/a AmerenUE	EC-2004-0598
Empire District Electric Company	ER-2004-0570
Union Electric Company d/b/a AmerenUE	EC-2005-0110
Union Electric Company d/b/a AmerenUE	EC-2005-0177
Union Electric Company d/b/a AmerenUE	EC-2005-0313
Empire District Electric Company	EO-2005-0275
Aquila Networks – MPS	EO-2005-0270
Union Electric Company d/b/a AmerenUE	EO-2006-0145
Empire District Electric Company	ER-2006-0315

COMPANY	CASE NUMBER
Aquila Networks – MPS	ER-2005-0436
Union Electric Company d/b/a AmerenUE	EO-2006-0096
West Central Electric Cooperative	EO-2006-0339
Kansas City Power and Light Company	ER-2006-0314
Union Electric Company d/b/a AmerenUE	EO-2008-0031
Union Electric Company d/b/a AmerenUE	EC-2009-0193
Empire District Electric Company	ER-2008-0093
Missouri Rural Electric Cooperative	EO-2008-0332
Grundy Electric Cooperative	EO-2008-0414
Osage Valley Electric Cooperative	EO-2009-0315
Union Electric Company d/b/a AmerenUE	EO-2009-0400
Union Electric Company d/b/a AmerenUE	EO-2008-0310
Aquila Networks – MPS	EA-2008-0279
West Central Electric Cooperative	EO-2008-0339
Empire District Electric Company	EO-2009-0233
Union Electric Company d/b/a/ AmerenUE	EO-2009-0272
Empire District Electric Company	EO-2009-0181
Union Electric Company d/b/a AmerenUE	ER-2008-0318
Kansas City Power and Light Company	ER-2009-0089
Kansas City Power and Light – GMO	ER-2009-0090
Union Electric Company d/b/a AmerenUE	ER-2010-0036
Empire District Electric Company	ER-2010-0130
Laclede Electric Cooperative	EO-2010-0125
Union Electric Company d/b/a AmerenUE	EC-2010-0364
Union Electric Company d/b/a AmerenUE	EO-2011-0052
Kansas City Power and Light Company	ER-2010-0355
Union Electric Company d/b/a AmerenUE	EO-2010-0263
Kansas City Power and Light – GMO	EO-2011-0137
Kansas City Power and Light – GMO	ER-2010-0356
Union Electric Company d/b/a AmerenUE	ER-2011-0028
Kansas City Power and Light – GMO	EO-2012-0119
Kansas City Power and Light Company	EO-2011-0137
Union Electric Company d/b/a AmerenUE	ER-2012-0121
Union Electric Company d/b/a/ Ameren Missouri	EX-2012-0332
Empire District Electric Company	EO-2011-0085
Empire District Electric Company	EO-2012-0192
Empire District Electric Company	EO-2013-0313
Union Electric Company d/b/a AmerenUE	ER-2012-0180

COMPANY	CASE NUMBER
Union Electric Company d/b/a AmerenUE	EO-2013-0418
City Utilities of Springfield	EO-2012-0441
Kansas City Power and Light – GMO	EO-2012-0367
Empire District Electric Company	ER-2011-0004
Union Electric Company d/b/a/ Ameren Missouri	ER-2012-0166
Kansas City Power and Light Company	ER-2012-0174
Union Electric Company d/b/a/ Ameren Missouri	ER-2013-0044
Kansas City Power and Light – GMO	ER-2012-0175
Central Missouri Electric Cooperative	EO-2015-0137
Empire District Electric Company	ER-2012-0345
Kansas City Power and Light Company	EO-2012-0367
Boone Electric Cooperative	EO-2015-0012
Transource Missouri, LLC	EA-2013-0098
Black River Electric Cooperative	EO-2015-0096
Union Electric Company d/b/a/ Ameren Missouri	EW-2012-0369
Empire District Electric Company	ER-2014-0351
Union Electric Company d/b/a/ Ameren Missouri	EO-2014-0044
Union Electric Company d/b/a/ Ameren Missouri	EO-2013-0418
Union Electric Company d/b/a/ Ameren Missouri	EE-2013-0511
Union Electric Company d/b/a/ Ameren Missouri	EO-2015-0017
Union Electric Company d/b/a/ Ameren Missouri	EO-2016-0087
Union Electric Company d/b/a/ Ameren Missouri	EO-2014-0009
Kansas City Power and Light Company	EO-2014-0128
Union Electric Company d/b/a/ Ameren Missouri	EO-2017-0358
Empire District Electric Company	EO-2016-0192
Empire District Electric Company	EO-2017-0217
Union Electric Company d/b/a/ Ameren Missouri	EO-2014-0296
Union Electric Company d/b/a/ Ameren Missouri	EO-2015-0328
Union Electric Company d/b/a/ Ameren Missouri	ER-2014-0258
Union Electric Company d/b/a/ Ameren Missouri	EX-2017-0153
Union Electric Company d/b/a/ Ameren Missouri	EO-2019-0391
Empire District Electric Company	EO-2018-0118
Empire District Electric Company	ER-2016-0023
Union Electric Company d/b/a/ Ameren Missouri	EC-2016-0235
Union Electric Company d/b/a/ Ameren Missouri	EO-2018-0058
Union Electric Company d/b/a/ Ameren Missouri	EE-2019-0395
Kansas City Power and Light – GMO	ER-2016-0156
Kansas City Power and Light – GMO	EO-2019-0061

cont'd Alan J. Bax

COMPANY	CASE NUMBER
Kansas City Power and Light Company	ER-2014-0370
Union Electric Company d/b/a/ Ameren Missouri	EO-2017-0044
Kansas City Power and Light Company	ER-2016-0285
Empire District Electric Company	EO-2019-0381
Union Electric Company d/b/a/ Ameren Missouri	ER-2016-0179
Union Electric Company d/b/a/ Ameren Missouri	EO-2018-0278
Union Electric Company d/b/a/ Ameren Missouri	EO-2017-0127
Kansas City Power and Light Company	ER-2018-0145
Kansas City Power and Light Company – GMO	ER-2018-0146
Union Electric Company d/b/a/ Ameren Missouri	EE-2019-0383

Kory J. Boustead

Education and Employment Background

I am a Rate & Tariff Examiner in the Energy Resources Department, Industry Analysis Division of the Missouri Public Service Commission (Commission). I have been employed at the Missouri Public Service Commission as Rate & Tariff Examiner since July 2012.

In December 1998, I earned a Bachelor of Science degree in Business Administration with an emphasis in Marketing from Columbia College. I went on to earn a Master of Business Administration, in Business Administration and Management from William Woods University in 2001.

Prior to joining the Commission, beginning in 2002, I was employed with Ameren Missouri as a Customer Service Representative in the Jefferson City Call Center. In this role, I was responsible for answering customer inquiries and requests through the call center including establishment of new and transfer accounts. I effectively managed customer complaints, resolving billing issues, and handling trouble calls. I was responsible for establishing payment agreements, advising customers regarding collection procedures and responsible for maintaining personal telephone statistics and call volume in excess of company average. Prior to my employment with Ameren Missouri I worked for Sprint Telephone in customer service, KRCG-TV in advertising and was the retail store manager for Alamosa PCS (a Sprint PCS affiliate) in Jefferson City.

List of Previous Testimony Filed
Kory J. Boustead

Date Filed	Issue	Case Number	Case Name
05/30/2014	Direct - Staff Report - Low Income Weatherization Programs, Energy Efficiency, Service Line Extension	GR-2014-0086	Summit Natural Gas of Missouri, Inc.
06/06/2014	Direct - Staff Report - Low Income Weatherization Programs, Energy Efficiency, Main Line Extension	GR-2014-0152	Liberty Utilities
07/11/2014	Rebuttal - Energy Efficiency, Low Income Weatherization Program	GR-2014-0086	Summit Natural Gas of Missouri, Inc.
07/30/2014	Rebuttal - Low Income Weatherization Programs, Energy Efficiency, Main Line Extension	GR-2014-0152	Liberty Utilities
08/08/2014	Surrebuttal - Low Income Weatherization Program	GR-2014-0086	Summit Natural Gas of Missouri, Inc.
12/05/2014	Direct - Staff Report - Low Income Keeping Current Pilot Program	ER-2014-0258	Ameren Missouri
02/06/15	Surrebuttal - Low Income Keeping Current Pilot Program	ER-2014-0258	Ameren Missouri
04/03/2015	Direct - Staff Report - Economic Relief Pilot Program, Low Income Weatherization Program	ER-2014-0370	Kansas City Power & Light Company

cont'd Kory J. Boustead

Date Filed	Issue	Case Number	Case Name
03/25/2016	Direct - Staff Report - Low Income Programs, Low Income Weatherization Program	ER-2016-0023	The Empire District Electric Company
05/12/2016	Rebuttal - Low Income Weatherization Program	ER-2016-0023	The Empire District Electric Company
07/15/2016	Direct- Staff Report – Income-Eligible Weatherization, Economic Relief Pilot Program	ER-2016-0156	KCP&L Greater Missouri Operations Company
09/02/2016	Surrebuttal – Income-Eligible Weatherization, Economic Relief Pilot Program	ER-2016-0156	KCP&L Greater Missouri Operations Company
11/30/2016	Direct – Staff Report – Income-Eligible Weatherization, Economic Relief Pilot Program	ER-2016-0258	Kansas City Power & Light Company
12/09/2016	Direct – Staff Report - Low Income Keeping Current Pilot Program, Low Income Weatherization Assistance Program	ER-2016-0179	Ameren Missouri
01/20/2017	Rebuttal – Low Income Weatherization Program	ER-2016-0179	Ameren Missouri
02/28/2018	Staff Report - Emission Allowances and Interest	EO-2018-0067	Staff's Sixth Fuel Adjustment Clause Prudence Review Report – Ameren Missouri
03/16/2018	Direct – Staff Report – Tariff Organization	GR-2018-0013	Liberty Utilities

Date Filed	Issue	Case Number	Case Name
06/19/2018	Direct – Staff Report – Income Eligible Weatherization	ER-2018-0245	Kansas City Power & Light Company
04/30/2018	Direct – Staff Report – Interest	EO-2018-0155	First Prudence Review for Cycle 2 of Costs Related to the Demand-Side Programs for the Electric Operations of Union Electric Company, d/b/a Ameren Missouri
06/19/2018	Direct – Staff Report - Income Eligible Weatherization	ER-2018-0246	KCP&L Greater Missouri Operations Company
08/30/2018	Rebuttal – Low-Income Programs and Tariff design	EO-2018-0122	Ameren Missouri's 3 rd Filing to Implement Regulatory Changes in Furtherance of Energy Efficiency as Allowed by MEEIA
09/05/2018	Staff Report – Interest, Renewable Energy Credit Revenue and Plant Outages	EO-2018-0244	In the Matter of the Seventh Prudence Review of Costs Subject to the Commission Approved Fuel Adjustment Clause of The Empire District Electric Company
09/17/2018	Surrebuttal – Low-Income Programs and Tariff design	EO-2018-0122	Ameren Missouri's 3 rd Filing to Implement Regulatory Changes in Furtherance of Energy Efficiency as Allowed by MEEIA
02/28/2019	Staff Report – Renewable Energy Credits	EO-2019-0067	In the Matter of the Eighth Prudence Review of Costs Subject to the Commission-Approved Fuel Adjustment Clause of KCP&L Greater Missouri Operations Company
02/28/2019	Staff Report – Renewable Energy Credits	EO-2019-0068	In the Matter of the Second Prudence Review of Costs Subject to the Commission-Approved Fuel Adjustment Clause of Kansas City Power and Light Company

Date Filed	Issue	Case Number	Case Name
4/19/2019	Staff Direct Cost of Service Report – Energy Efficiency, Low-Income Programs & Low-Income Weatherization	GR-2019-0077	In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Increase its Revenues for Natural Gas Service
6/6/2019	Rebuttal Testimony - Renewable Energy Credits	EO-2019-0067	In the Matter of the 8 th Prudence Review of Costs Subject to the Commission-Approved Fuel Adjustment Clause of KCP&L Greater Missouri Operations Company
6/7/2019	Rebuttal Testimony – Energy Efficiency, Low-Income Programs and Low-Income Weatherization	GR-2019-0077	In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Increase its Revenues for Natural Gas Service
7/10/2019	Surrebuttal Testimony - Energy Efficiency, Low-Income Programs & Low-Income Weatherization	GR-2019-0077	In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Increase its Revenues for Natural Gas Service
7/22/2019	Cross-Rebuttal Testimony – Renewable Energy Credits	EO-2019-0067	In the Matter of the 8 th Prudence Review of Costs Subject to the Commission-Approved Fuel Adjustment Clause of KCP&L Greater Missouri Operations Company

DAVID BUTTIG, PE

PRESENT POSITION:

I am a Utility Regulatory Engineer I in the Engineering Analysis Department, Industry Analysis Division, of the Missouri Public Service Commission.

EDUCATIONAL BACKGROUND AND WORK EXPERIENCE:

I received my Bachelor of Science Degree in Environmental Engineering from the Missouri University of Science & Technology in May of 2012. In February of 2013 I began employment with the Missouri Department of Natural Resources in the Air Pollution Control Program as an Environmental Engineer I. In February of 2014, I was promoted to an Environmental Engineer II within the Air Pollution Control Program. I began employment with the commission in July of 2018. I am a licensed professional engineer in the State of Missouri.

SUMMARY OF CASE INVOLVEMENT:

Case Number	Utility	Type	Issue
EA-2019-0010	Empire District Electric Company	Staff Report	Certificate of Convenience and Necessity
GR-2019-0077	Ameren Missouri (Gas)	Staff Report Rebuttal Testimony	Depreciation
GE-2020-0009	Summit Natural Gas of Missouri	Memorandum	Waiver Request

Christopher D. Caldwell

Educational and Employment Background and Credentials

In May 2001, I earned an Associate Degree in Applied Accounting from St. Louis Community College (Forest Park). In May 2009, I earned a Bachelor of Science Degree in Accounting from Harris-Stowe State University. I also earned a Master's Degree in Business Administration from Fontbonne University in May 2013.

My employment began on Sept. 5, 2017 with the Missouri Public Service Commission (Commission) as a Utility Regulatory Auditor. My duties as a Utility Regulatory Auditor, consists of examining the regulatory books and records of utilities that operate within the State of Missouri and sponsoring testimony as an expert witness in proceedings before the Commission.

Prior to working at the Commission, between 2008 and 2017, I held the following positions: Account Clerk I with the Missouri Division of Youth Services, Account Clerk II and Financial Officer I with the Department of Mental Health, and Senior Financial Technician with the Missouri Dept. of Transportation (MODOT).

As an Account Clerk I with the Division of Youth Services, my duties consisted of processing accounts payable, filing completed invoices, maintaining gas and maintenance for the facility fleet, ordering and distributing disposable inventory such as office supplies, copy paper, hygiene supplies, and school books. I also balanced the budget, and maintained an inventory of government property at the youth facility among other duties.

As an Account Clerk II with the Department of Mental Health, my duties consisted of processing accounts payable and filing completed invoices, reconciling invoice discrepancies, processing expense reports, and maintaining an inventory of government property at Missouri state mental health facilities among other duties.

As a Financial Officer I with the Department of Mental Health, my duties consisted of monitoring bank accounts, Medicare and Medicaid benefits for clients at Missouri state mental health facilities and at contracted independent living facilities. I also communicated with staff, the public, contracted facilities and other government agencies and performed other duties as assigned.

As a Senior Financial Technician at MODOT, my duties consisted of processing accounts payable, electronically filing completed invoices, reconciling invoice discrepancies, and maintaining an inventory of government property at all MODOT facilities in the St. Louis Metropolitan Area. I communicated with staff, and contracted vendors. I was part of a committee that set-up team building events. I also participated in a diversity program, and completed required training, and other duties as assigned.

Christopher D. Caldwell

Rate Case Proceeding Summary

Case Number	Company Name	Issues
GR-2019-0077	Ameren Missouri Gas	Advertising Promotional Giveaways Dues and Donations Environmental Costs Miscellaneous Expenses External Audit Fees Injuries and Damages Insurance Lobbying and MEDA Miscellaneous Expense PSC Assessment Rents and Leases
GR-2018-0013	Liberty Utilities Midstates Natural Gas (MNG)	Plant In Service Accumulated Reserve Customer Deposits Interest on Customer Deposits Customer Advances Gas Storage Prepayments Capitalized Depreciation

JOHN P. CASSIDY

EDUCATIONAL AND EMPLOYMENT BACKGROUND AND CREDENTIALS

Position

I am a Utility Regulatory Auditor V in the Auditing Department, Financial and Business Analysis Division. My business address is 111 North Seventh Street, Suite 105, St. Louis, Missouri 63101. Since joining the Missouri Public Service Commission's Auditing Department Staff in 1990, I have assisted with, directed and coordinated audits and examinations of the books and records of utility companies operating within the State of Missouri. I have participated or sponsored testimony in rate cases, earnings complaint cases, mergers and acquisitions cases, accounting authority order applications and certificate of convenience and necessity applications. I have also supervised and conducted numerous audits of small water and sewer companies in conjunction with the Commission's informal rate proceedings. Please refer to the following pages of this schedule for a list of rate case proceedings in which I have previously filed testimony.

Education

Southeast Missouri State University

Cape Girardeau, Missouri

Bachelor of Science Degree in Business Administration

Double Major: Marketing 1989 and Accounting 1990

RATE CASE PROCEEDING PARTICIPATION

JOHN P. CASSIDY

<u>COMPANY</u>	<u>CASE NO.</u>
Missouri Cities Water Company Payroll and Related Pensions OPEBS Insurance Expense Advertising Expense Miscellaneous Expenses Type of Testimony Filed: Direct and Surrebuttal	WR-91-172
St. Louis County Water Company Tank Painting Main Failures Residue Removal General Insurance Expense PSC Assessment Miscellaneous Expenses Type of Testimony Filed: Direct	WR-91-361
Southwestern Bell Telephone Company Advertising Expenses Promotional Giveaways Miscellaneous Expenses Type of Testimony Filed: Direct and Surrebuttal	TC-93-224
Laclede Gas Company Payroll and Payroll Taxes Incentive Compensation 401 (K) Dental and Vision Insurance Data Processing Type of Testimony Filed: Direct	GR-94-220

cont'd John P. Cassidy

COMPANY

CASE NO.

The Empire District Electric Company

ER-95-279

Revenues
Uncollectibles Expense
Municipal Franchise Taxes
Postage Expense
Emission Credits

Type of Testimony Filed: Direct

Imperial Utility Corporation

SC-96-247

Rate Base
Depreciation Reserve
Depreciation Expense
CIAC
Property Taxes
Property Insurance
Lab Testing Expense
Sludge Removal Expense

Type of Testimony Filed: Rebuttal

St. Louis County Water Company

WR-97-382

Payroll and Payroll Taxes
Employee Benefits
Employee Savings
Shared Employees

Type of Testimony Filed: Direct

Laclede Gas Company

GR-98-374

Payroll and Payroll Taxes
401 (K)
Health Care Costs
Pension Plan
Director's Pension Plan
Trustee Fees
SERP
Outside Consulting
Incentive Compensation
Advertising Expense

Type of Testimony Filed: Direct

cont'd John P. Cassidy

COMPANY

CASE NO.

United Water Missouri, Inc.

WR-99-326

Payroll and Payroll Taxes

401 (K)

Health Care Costs

Employee Relocation

Corporation Franchise Tax

Advertising Expense

Dues and Donations

Miscellaneous Expenses

Type of Testimony Filed: Direct

Union Electric Company

EC-2000-795

Injuries and Damages

Legal Expense

Environmental Expense

Type of Testimony Filed: Direct

Union Electric Company

GR-2000-512

Revenues

Uncollectibles Expense

Customer Deposits

Type of Testimony Filed: Direct

Laclede Gas Company

GR-2001-629

Revenues

Gross Receipts Tax

Gas Supply Incentive Plan

Gas Costs

Uncollectibles Expense

Non-Utility Operations

Type of Testimony Filed: Direct

cont'd John P. Cassidy

COMPANY

CASE NO.

Union Electric Company, d/b/a AmerenUE

EC-2002-01

Fuel Expense
Callaway Refueling
Legal Expense
Environmental Expense
Capacity Purchases
Midwest ISO
Payroll and Related
Incremental Overtime

Type of Testimony Filed: Direct and Surrebuttal

Union Electric Company, d/b/a AmerenUE

EC-2002-1025

Legal Expense
Environmental Expense
Midwest ISO

Type of Testimony Filed: Direct

Laclede Gas Company

GR-2002-356

Revenues
Gross Receipts Tax
Gas Supply Incentive Plan
Gas Costs
Uncollectibles Expense
Income Taxes

Type of Testimony Filed: Direct

Laclede Gas Company

GT-2003-0117

Financial Aspects

Type of Testimony Filed: Direct

cont'd John P. Cassidy

COMPANY

CASE NO.

Missouri-American Water Company

WR-2003-0500 & WC-2004-0168

Allocation of Belleville Labs Cost to MAWC
National Call Center
Compensation for Services Provided from MAWC to AWR
Information Technology Services
Capitalization of Shared Services
Transition Costs
Cost Allocation Manual
Affiliate Transactions
Severance Costs
National Call Center Transition Costs
National Shared Services Transition Costs

Type of Testimony Filed: Direct & Surrebuttal

Missouri-American Water Company

SM-2004-0275

Acquisition Adjustment

Type of Testimony Filed: Direct

The Empire District Electric Company

ER-2004-0572

Interim Energy Charge
Fuel Expense
Purchased Power
Off System Sales
KCPL Transmission Expense
Income Taxes

Type of Testimony Filed: Direct & Surrebuttal

Union Electric Company d/b/a AmerenUE

GR-2007-0003

Environmental Expense

Type of Testimony Filed: Direct

cont'd John P. Cassidy

COMPANY

CASE NO.

Union Electric Company d/b/a AmerenUE

ER-2007-0002

Fuel Expense
Fuel Inventories
Callaway Refueling Costs
Combustion Turbine Maintenance Expense
Environmental Expense
Gains on the Sale of Sulfur Dioxide Emission Allowances

Type of Testimony Filed: Direct, Rebuttal and Surrebuttal

Missouri-American Water Company

WR-2007-0216

Belleville Labs Allocation
Compensation for Services MAWC Provided to AWR
Income Taxes

Type of Testimony Filed: Direct

Union Electric Company d/b/a AmerenUE

ER-2008-0318

Fuel and Purchased Power Expense
Off System Sales
Fuel Inventories
Callaway Refueling Costs
Generating Plant Outages
Capacity Charges
Entergy Refunds
Non-Labor Storm Costs – Test Year
Non-Labor Storm Cost AAO
Non-Labor Storm Cost Amortization
SO2 Emission Allowance Sales and Tracker
Deferred Income Taxes for Rate Base
Income Taxes
Production Cost Model Issues

Type of Testimony Filed: Direct and Surrebuttal

cont'd John P. Cassidy

COMPANY

CASE NO.

Union Electric Company d/b/a AmerenUE

ER-2010-0036

Corporate Allocations
Potential Refundable Entergy Charges
Payroll and Payroll Taxes
Employee Benefits
Voluntary Separation Election
Involuntary Separation Program
Severance Costs
Callaway Security Force

Type of Testimony Filed: Direct

Laclede Gas Company

GR-2010-0171

Report on Revenue Requirement Cost of Service
Overview of Staff's Filing
Revenue Associated with Propane Sale
Insulation Financing
Energy Wise
NITEC Study
Home Sales Reinspection Fees
Gain on Sale of Property
Emergency Cold Weather Rule AAO
IFRS AAO
Gas Safety AAOs
Line of Credit Fees

Type of Testimony Filed: Direct, Rebuttal and Surrebuttal

Union Electric Company d/b/a AmerenUE

ER-2011-0028

Accumulated Deferred Income Taxes
Potential Refundable Entergy Charges
Payroll
Payroll Taxes
Voluntary Separation Election Plan
Involuntary Separation Program
Test Year Severance Costs
Amortization of Severance Costs
Other Employee Benefits
Test Year Storm Costs
Storm Cost AAO Case Nos. EU-2008-0141 and ER-2008-0318
Rebranding Costs
Income Taxes

Type of Testimony Filed: Direct and Surrebuttal

cont'd John P. Cassidy

COMPANY

CASE NO.

Union Electric Company d/b/a Ameren Missouri

ER-2012-0166

Report on Revenue Requirement Cost of Service

Overview of Staff's Filing

Plant-in-Service Accounting

Accumulated Deferred Income Taxes

Employee Stock Ownership Plan Deduction

Income Taxes

Missouri Jurisdictional Allocation Factors

Lake of the Ozarks Shoreline Management Program

Storm Assistance Revenues and Expenses

Renewable Energy Standard Costs

Type of Testimony Filed: Direct, Rebuttal and Surrebuttal

Union Electric Company d/b/a Ameren Missouri

EA-2012-0281

Costs Associated with Labadie Energy Center Expansion

Alternative Site Studies

Type of Testimony Filed: Rebuttal, Cross-Surrebuttal and
Supplemental-Surrebuttal

Union Electric Company d/b/a Ameren Missouri

EC-2014-0223

Complaint Case – Rate Levels

Type of Testimony Filed: Rebuttal and Surrebuttal

cont'd John P. Cassidy

COMPANY

CASE NO.

Union Electric Company d/b/a Ameren Missouri

ER-2014-0258

Report on Revenue Requirement Cost of Service
Overview of Staff's Filing
Demand Side Management Costs in Rate Base
Netting of Regulatory Assets and Liability Amortizations
New and Continuing Regulatory Asset and
Regulatory Liability Amortizations
Noranda Accounting Authority Order Lost Revenue Deferral
Energy Efficiency Regulatory Asset Amortizations
Renewable Energy Standard Costs
Renewable Energy Standard Accounting Authority Order –
Regulatory Asset/Liability Amortizations
Maryland Heights Energy Center Fuel Costs
Pioneer Prairie Wind Contract
Solar Rebates
Removal of Missouri Energy Efficiency Investment Act
Costs in Test Year
Callaway Nuclear Power Plant Relicensing Costs
Jurisdictional Allocations

Type of Testimony Filed: Direct, Rebuttal and Surrebuttal

Missouri-American Water Company

WR-2015-0301

Report on Revenue Requirement Cost of Service
Overview of Staff's Filing
True-Up Audit
ISRS Collections
Metering Issues

Type of Testimony Filed: Direct and Surrebuttal

cont'd John P. Cassidy

COMPANY

CASE NO.

Union Electric Company d/b/a Ameren Missouri

ER-2016-0179

Energy Efficiency / Demand Side Management
Regulatory Assets
Energy Efficiency / Demand Side Management
Regulatory Amortizations
Renewable Energy Standard Costs
Renewable Energy Standard AAO –Regulatory
Asset / Liability Amortizations
Solar Rebates Regulatory Asset Balance Established
in Case No. ER-2014-0258
Solar Rebates Regulatory Asset Balance
Established in Case No. ER-2016-0179
Over / Under Collection of Solar Rebates
Noranda Lost Revenue Deferral and Amortization
Callaway Life Extension Costs and Regulatory Asset
Amortization
Nuclear Safety Study Costs Amortization
Netting of Regulatory Asset and Liability Amortizations
in Case No. ER-2014-0258
Missouri Efficiency Investment Act Costs
Electric Vehicle Charging Stations

Type of Testimony Filed: Direct and Rebuttal

**Liberty Utilities (Midstates Natural Gas) Corp.
d/b/a Liberty Utilities**

GR-2018-0013

Energy Efficiency and Residential Low Income
Weatherization Assistance Regulatory Asset
Included In Rate Base
Pension Regulatory Asset/Liability – Rate Base
OPEBS Regulatory Asset/Liability – Rate Base
Case No. GM-2012-0037 Rate Base Offsets
Transition and Transaction Costs
Hannibal Shop and Affiliate Lease
Rent and Lease Expense
Affiliate Transactions
Utility Costs –Hannibal Shop
Energy Efficiency Amortizations
Energy Efficiency and Residential Low Income
Weatherization Assistance Funding Levels

Type of Testimony Filed: Direct and Surrebuttal/True-Up Direct

KIM COX

Education and Employment Background and Credentials

I attended Central Missouri State University at Warrensburg, Missouri. In May 1996, I received a Bachelor of Science degree.

I am currently employed as a Utility Policy Analyst II with the Tariff/Rate Design Department within the Industry Analysis Division of the Missouri Public Service Commission (Commission). I have been employed by the Commission since July, 2009. From July 2009 to June 2013, I worked in the Tariffs/Rate Design Section of the Energy Unit as a Rate and Tariff Examiner III, where my duties consisted of analyzing applications, reviewing tariffs and making recommendations based upon those evaluations. On June 16, 2013, I assumed my current position as Utility Policy Analyst II within the same Section, where my duties consist of coordinating highly complex activities, analyzing applications, reviewing tariffs, and making recommendations based upon my evaluations. I currently serve on the NARUC Staff Subcommittee on Rate Design. Prior to joining the Commission, I held the position of a Quality Assurance Analyst in the regulatory field for ten years.

KIM COX

Summary of Case Involvement

	Company	Issue	Type of Filing
GR-2009-0434	The Empire District Gas Company	Weather Normalized Sales and Coincident-Peak Day Demand	Staff Report
GR-2010-0171	Laclede Gas Company	Weather Normalized Sales, Blocks and Coincident-Peak Day Demand	Staff Report
GR-2010-0171	Laclede Gas Company	Weather Normalized Sales	Rebuttal
GR-2010-0363	Union Electric d/b/a AmerenUE	Weather Normalized Sales, Blocks and Coincident-Peak Day Demand	Staff Report
GR-2010-0347	Southern Missouri Natural Gas	Weather Normalized Sales	Staff Report
GR-2010-0192	Atmos	Weather Normalized Sales and Coincident-Peak Day Demand	Staff Report
HR-2011-0241	Veolia	Weather Normalized Sales	Staff Report
ER-2012-0175	KCP&L and GMO	L&P Normalization and Annualization	Staff Report
GR-2014-0007 Coordinated	Missouri Gas Energy	Direct COS sponsor of Weather, Weather Normalization and Large Volume Customer Revenue Adjustment	Direct Testimony
GR-2014-0007 Coordinated	Missouri Gas Energy	Direct CCOS sponsor of Rate Design, Miscellaneous Tariff Issues, School Transportation Capacity, Gas Supply Incentive Plan and Staff's CCOS	Direct Testimony
GR-2014-0086	Summit Natural Gas	Lake Ozark Transportation	Staff Report
GR-2014-0152	Liberty Utilities	Special Contract, Large and Industrial Customers	Staff Report, Rebuttal and Surrebuttal
ER-2016-0023	Empire	Large Power Feed Mill Annualization	Staff Report

cont'd Kim Cox

	Company	Issue	Type of Filing
GR-2017-0215 and GR-2017-0216	Spire Missouri Inc.	Executive Summary, Background, Test Year/True- Up Period and Staff's Revenue Requirement Recommendation	Staff Report
ER-2018-0145 and ER- 2018-0146	Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company	Rate Revenues Introduction, The Development of Rate Revenue, Regulatory Adjustments to Test Year Sales and Rate Revenue, Customer Growth, and Adjustment for Non- Missouri classes	Staff Report
GR-2019-0077	Union Electric Company, d/b/a Ameren Missouri	Class Cost of Service, Rate Design and Bill Format Recommendation	Staff Report

Jane C. Dhority

Present Position:

I am a Utility Regulatory Auditor I, Auditing Department, Financial & Business Analysis Division of the Missouri Public Service Commission. As a Utility Regulatory Auditor, I assist in research and analysis of the financial aspects of public utility operations.

Educational Credentials and Work Experience:

I have a Bachelor of Science in Accounting from the University of Missouri - St. Louis. I have been employed by the Missouri Public Service Commission since April 2019. Prior to joining the Commission, I worked in several positions for Jimmy's Café on the Park from 2011 to 2016. I was also employed by Hilton St. Louis Downtown as a bartender from 2009 to 2011. From 2007 to 2009 I was employed as a bartender and manager for Square One Brewery.

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Ameren UE (ELEC)	EO-2019-0391	Asset Sale Case

CLAIRE M. EUBANKS, PE

PRESENT POSITION:

I am a Utility Regulatory Engineer II in the Engineering Analysis Department, of the Industry Analysis Division of the Missouri Public Service Commission.

EDUCATIONAL BACKGROUND AND WORK EXPERIENCE:

I received my Bachelor of Science degree in Environmental Engineering from the University of Missouri – Rolla, now Missouri University of Science and Technology, in May 2006. I am a licensed professional engineer in the states of Missouri and Arkansas. Immediately after graduating from UMR, I began my career with Aquaterra Environmental Solutions, Inc., now SCS Aquaterra, an engineering consulting firm based in Overland Park, Kansas. During my time with Aquaterra, I worked on various engineering projects related to the design, construction oversight, and environmental compliance of solid waste landfills. I began my employment with the Commission in November 2012 and was promoted to my current position in January 2017. My primary responsibilities are related to the Renewable Energy Standard. I have also served on work groups related to the Clean Power Plan and Ameren Missouri’s Standby Service Rider.

CASE HISTORY:

Case Number	Utility	Type	Issue
EA-2012-0281	Ameren	Rebuttal	Certificate of Convenience and Necessity
EC-2013-0379 EC-2013-0380	KCP&L KCP&L GMO	Rebuttal	RES Compliance
EO-2013-0458	Empire	Memorandum	RES Compliance Plan & Report
EO-2013-0462	Ameren	Memorandum	RES Compliance Report
EO-2013-0503	Ameren	Memorandum	RES Compliance Plan
EO-2013-0504	KCPL	Memorandum	RES Compliance Plan & Report
EO-2013-0505	GMO	Memorandum	RES Compliance Plan & Report
ET-2014-0059	KCP&L GMO	Rebuttal	RES Retail Rate Impact
ET-2014-0071	KCP&L	Rebuttal	RES Retail Rate Impact
ET-2014-0085	Ameren	Rebuttal	RES Retail Rate Impact
ER-2014-0258	Ameren	Cost of Service Report, Surrebuttal	RES, In-Service

cont'd Claire M. Eubanks, PE

Case Number	Utility	Type	Issue
EO-2014-0151	KCP&L GMO	Memorandum	RESRAM
EO-2014-0357	Electric	Memorandum	Solar Rebates Payments
EO-2014-0287	KCPL	Memorandum	RES Compliance Plan
EO-2014-0288	GMO	Memorandum	RES Compliance Plan
EO-2014-0289	KCPL	Memorandum	RES Compliance Report
EO-2014-0290	GMO	Memorandum	RES Compliance Plan
ER-2014-0370	KCP&L	Cost of Service Report	RES
EX-2014-0352	N/A	Live Comments	RES rulemaking
EC-2015-0155	GMO	Memorandum	Solar Rebate Complaint
EO-2015-0260	Empire	Memorandum	RES Compliance Plan & Report
EO-2015-0263	KCPL	Memorandum	RES Compliance Report
EO-2015-0264	GMO	Memorandum	RES Compliance Report
EO-2015-0265	KCPL	Memorandum	RES Compliance Plan
EO-2015-0266	GMO	Memorandum	RES Compliance Plan
EO-2015-0267	Ameren	Memorandum	RES Compliance Plan & Report
EO-2015-0252	GMO	Staff Report	Integrated Resource Plan – Renewable Energy Standard
EO-2015-0254	KCPL	Staff Report	Integrated Resource Plan – Renewable Energy Standard
EA-2015-0256	KCP&L GMO	Live Testimony	Greenwood Solar CCN
EO-2015-0279	Empire	Memorandum	RES Compliance Plan & Report
ET-2016-0185	KCP&L	Memorandum	Solar Rebate Tariff Suspension
EO-2016-0280	KCPL	Memorandum	RES Compliance Report
EO-2016-0281	GMO	Memorandum	RES Compliance Report
EO-2016-0282	KCPL	Memorandum	RES Compliance Plan
EO-2016-0283	GMO	Memorandum	RES Compliance Plan
EO-2016-0284	Ameren	Memorandum	RES Compliance Plan & Report
ER-2016-0023	Empire	Report	RES
ER-2016-0156	KCP&L GMO	Rebuttal	RESRAM Prudence Review

cont'd Claire M. Eubanks, PE

Case Number	Utility	Type	Issue
EA-2016-0208	Ameren	Rebuttal	Certificate of Convenience and Necessity
ER-2016-0285	KCPL	Cost of Service Report	In-Service, Greenwood Solar
ER-2016-0179	Ameren	Rebuttal	In-Service, Labadie Landfill
EW-2017-0245	Electric	Report	Working Case on Emerging Issues in Utility Regulation
EO-2017-0268	Ameren	Memorandum	RES Compliance Plan & Report
EO-2017-0269	KCPL	Memorandum	RES Compliance Report
EO-2017-0271	KCPL	Memorandum	RES Compliance Plan
GR-2017-0215 & GR-2017-0216	Spire	Rebuttal & Surrebuttal	CHP for Critical Infrastructure
GR-2018-0013	Liberty Utilities (Midstates Natural Gas)	Rebuttal	CHP Outreach Initiative for Critical Infrastructure Resiliency
EO-2018-0287	Ameren	Memorandum	RES Compliance Plan & Report
EO-2018-0288	KCPL	Memorandum	RES Compliance Report
EO-2018-0290	KCPL	Memorandum	RES Compliance Plan
EA-2016-0207	Ameren	Memorandum	Certificate of Convenience and Necessity
ER-2018-0146	GMO	Cost of Service Report	RESRAM Prudence Review
ER-2018-0145 ER-2018-0146	KCPL GMO	Class Cost of Service Report, Rebuttal	Solar Subscription Pilot Rider, Standby Service Rider
EA-2018-0202	Ameren	Staff Report	Certificate of Convenience and Necessity
EE-2019-0076	Ameren	Memorandum	Variance Request – Reliability Reporting
EA-2019-0021	Ameren	Staff Report	Certificate of Convenience and Necessity
EA-2019-0010	Empire	Staff Report	Certificate of Convenience and Necessity
EX-2019-0050	N/A	Live Comments	Renewable Energy Standard

cont'd Claire M. Eubanks, PE

Case Number	Utility	Type	Issue
EO-2019-0315	KCPL	Memorandum in Response to Commission Questions	Renewable Energy Standard
EO-2019-0316	GMO	Memorandum	Renewable Energy Standard
EO-2019-0317	KCPL	Memorandum in Response to Commission Questions	Renewable Energy Standard
EO-2019-0318	GMO	Memorandum	Renewable Energy Standard

Lisa M. Ferguson

Present Position:

I am a Utility Regulatory Auditor V, Auditing Department, Financial and Business Analysis Division of the Missouri Public Service Commission. As a Utility Regulatory Auditor, I review all exhibits and testimony on assigned issues, develop accounting adjustments and issue positions that are supported by workpapers and written testimony.

Educational Credentials and Work Experience:

I have an Associate of Science degree from Moberly Area Community College, a Bachelor's of Science degree in Accounting from Truman State University, and a Master's degree in Accounting from Truman State University. I have been employed by the Missouri Public Service Commission since June 2008. Prior to joining the Commission, I worked in several departments, primarily Customer Service and as an accounting assistant, for Hy-Vee Food and Drug from July 1998 to May 2002. I was also employed by Kelly L. Lovekamp as a legal office assistant during 2001. From June 2002 to May 2008, I was employed as a support staff for Chariton Valley Association. My duties included support of daily living activities for people with disabilities.

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Ameren Missouri (Gas)	GR-2019-0077	Lead Auditor TCJA Income Tax AAO/Interim Rates Income Tax, Accumulated Deferred Income Tax (ADIT), Amortization of Excess ADIT, Pensions & OPEBs, Energy Efficiency, Regulatory Asset Overcollection
Missouri-American Water Co.	WO-2018-0373	ISRS - Accumulated Deferred Income Taxes (Inclusion of NOL)
Ameren Missouri (ELEC)	EA-2018-0202	Terra-Gen Wind Generation CCN
Ameren Missouri (ELEC)	ER-2018-0362	2017 TCJA Tax Reform effect on current and excess deferred taxes
Liberty Gas (MNG)	GR-2018-0013	Income Tax, Accumulated Deferred Income Tax (ADIT), Property Tax, Vegetation Management, Payroll, Payroll Tax, Employee Benefits Accounting Schedules/Reconciliation Filed Direct, Rebuttal, Surrebuttal (True-up Direct)

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Spire Missouri (Laclede Gas & Missouri Gas Energy)	GR-2017-0215 GR-2017-0216	Co-Lead Auditor Insulation Financing, EnergyWise Revenue/Rate Base, Gas Safety AAO Overcollection, Natural Gas/Propane Inventory, MGE Rate base Offset, Income Taxes, ADIT, Surveillance Reporting, Uniform Expense, AMR Devices Filed Direct, Rebuttal, Surrebuttal Testified on FIN 48 as part of ADIT, Surveillance Reporting, AMR Devices, 2017 TCJA Tax Reform effect on current and excess deferred taxes
Ameren Missouri	EO-2017-0176	Cost Allocation Manual
Ameren Missouri	EO-2017-0127	Asset Sale Case – Mercy Health
Ameren Missouri (ELEC)	ER-2016-0179	Allocations, Coal Refinement, Callaway II Write-Off, Capacity, FAC expense removal, FIN 48, Income Taxes, ADIT, Mark Twain Transmission, MISO revenues & expenses, MISO Transmission revenues & expenses, Sioux Construction Accounting Accounting Schedules/Reconciliation Filed Direct, Rebuttal, Surrebuttal

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Rex Deffenderfer Enterprises	WR-2016-0267	Lead Auditor – Oversee All Issues
House Springs Sewer Co.	SM-2016-0204	Sale of Company Assets to Jefferson County Public Sewer District
Missouri-American Water Co.	WR-2015-0301 & SR-2015-0302	Amortizations, Arnold Acquisition, Belleville Labs, Capitalized O&M Depreciation, Regulatory Assets & Liabilities, Regulatory Deferrals, Hickory Hills Receivership Costs Accounting Schedules/Reconciliation
Missouri-American Water Co.	WO-2016-0054	Asset Purchased Case; Missouri American Acquisition of Jaxson Estates
House Springs Sewer Co.	Earnings Investigation	Operations & Maintenance Contract, Legal Fees, Office Rent & Electric, Plant/Reserve/CIAC, Repairs & Maintenance, Sludge Hauling, City of Byrnes Mill Expense, Garnishment
Ameren Missouri (ELEC)	ER-2014-0258	Fuel, NBEC, Fuel Additives, Fuel Inventory, Off System Sales, Purchased Power, Callaway Refueling, Coal Car Depreciation, Low Level Radioactive Waste Expense Accounting Schedules/Reconciliation Filed Direct, Rebuttal, Surrebuttal

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Liberty Gas (MNG)	GR-2014-0152	Board of Directors Fees, Payroll, Employee Benefits, Incentive Compensation, Environmental Expense, Fleet Fuel Expense, Property Tax, Relocation Expense
Terre Du Lac Utility Co.	WR-2014-0104 SR-2014-0105	Revenues, Uncollectibles, Water Loss Adjustment
Laclede Gas Co.	GR-2013-0171	Revenue, Energy Wise and Insulation Revenues and Ratebase, Gas Costs, Gross Receipts Tax, ISRS Revenue, OSS and Capacity Release, Postage Expense, Unbilled Revenues, Uncollectibles
Lincoln County Water & Sewer	SR-2013-0321	Revenues, Bank Fees, Billing Expense, DNR Fees, Office Supplies, Postage Expense, PSC Assessment, SOS Fees, Uncollectibles
Gladlo Water and Sewer Co.	SR-2013-0258 WR-2013-0259	Informal Rate Case – All Issues
Missouri-American Water Co.	SO-2013-0260	Asset Purchased Case; Missouri American Acquisition of Meramec Sewer Co; Rate Base Determination
Ameren Missouri	EO-2013-0044	Asset Sale Case
Meramec Sewer Co	SR-2012-0309	Rate Base, Revenues, Uncollectibles

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Ameren Missouri (ELEC)	ER-2012-0166	Advertising, AMS Allocations, Capitalized O&M Depreciation, Distribution Training, Employee Benefits other than Pensions, Environmental Expense, Incentive Compensation, Legal Expense, Name Change/Branding Expense, Payroll, Payroll Taxes, Production Training Expense, Severance, Underground Training Expense, VSE/ISP Amortization EMS Accounting Schedules Filed Direct and Surrebuttal Testimony Deposed on Severance and Advertising Testified on Severance
Missouri-American Water Co.	SO-2012-0091	Asset Purchased Case; Missouri American Acquisition of Meramec Sewer Co; Rate Base Determination
House Springs Sewer Co.	SR-2011-0274	Revenues, Billing Supplies Expense, Bank Fees, Dues & Donations, Outside Services, Miscellaneous Expense, Rent Expense, Postage Expense, PSC Assessment, Rate Case Expense, Secretary of State Fees, EMS Accounting Schedules
Missouri-American Water Co.	WO-2011-0106	ISRS Filing; Extending data to Effective Date; Retirements; Deferred Taxes; Accumulated Depreciation

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Ameren Missouri (ELEC)	ER-2011-0028	Capitalized O&M Depreciation, Dues & Donations, 900 Account analysis, Property Taxes, Other Rate Base Items, Corporate Franchise Taxes, CWC, Plant and Reserve, PSC Assessment, Rate Case Expense, Advertising, Interest on Customer Deposits, Outside Contractors/Services, Allocations Accounting Schedules/Reconciliation Filed Direct and Surrebuttal Testimony Deposed on Advertising Testified on Property Tax
AmerenUE (GAS)	GR-2010-0363	Capitalized O&M Depreciation, Dues & Donations, 900 Account analysis, Property Taxes, Other Rate Base Items, Corporate Franchise Taxes, CWC, Plant and Reserve, PSC Assessment, Rate Case Expense, Advertising, Interest on Customer Deposits, Outside Contractors/Services Accounting Schedules/Reconciliation Filed Direct Testimony
KMB Utility Corporation	WR-2010-0345 & SR-2010-0346	Revenues, Late Fees, Electric Bills, Lost Water Adjustment, Uncollectibles, Master meter reads Filed Staff Recommendation

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Ameren UE (ELEC)	ER-2010-0036	Advertising, Capitalized O&M Depreciation, Dues & Donations, 900 Account Analysis, Property Taxes, Other Rate Base Items, Corp. Franchise Taxes, Leases, CWC, Plant, Depreciation/ Reserve, PSC Assessment, Rate Case Expense, Interest on Customer Deposits, Insurance Expenses, Accounting Runs, Injuries and Damages Accounting Schedules/Reconciliation Filed Direct and Surrebuttal Testimony
Peaceful Valley	SR-2009-0146 WR-2009-0145	Informal Small Water and Sewer Request for Rate Increase
Cannon Home Association	SR-2009-0144	Informal Small Water Request for Rate Increase
Atmos Energy	GO-2009-0046	Assisted on ISRS Filing; Extending data to Effective Date; Retirements; Deferred Taxes; Accumulated Depreciation; Removal of Meters
Ameren UE (GAS)	GT-2009-0038	Assisted on ISRS Filing; Extending data to Effective Date; Additions/Retirements; Deferred Taxes; Accumulated Depreciation
Laclede Gas Company	GO-2009-0029	Assisted on Abandonment Case – Recommendation Submission

Lisa M. Ferguson

Past Rate Case Proceedings:

<u>Company Name</u>	<u>Case No.</u>	<u>Issue</u>
Mill Creek	SR-2005-0116	Quarterly Reviews; Procedural Schedule; A/P Billing Calendar; Conference Calls; Discussion Notes; Revenues

Jordan Hull

CURRENT POSITION:

I am a Utility Engineering Specialist III in the Energy Resources Department, Industry Analysis Division, of the Missouri Public Service Commission.

EDUCATIONAL BACKGROUND & WORK EXPERIENCE:

I received my Bachelor of Science Degree in Biological Engineering from the University of Missouri-Columbia in May of 2016. In June of 2016 I began employment with the Missouri Department of Natural Resources in the Air Pollution Control Program as an Environmental Engineer I. In June of 2017, I was promoted to an Environmental Engineer II within the Air Pollution Control Program. I began employment with the commission in November of 2018.

SUMMARY OF CASE INVOLVEMENT:

Case Number	Utility	Type	Issues
EO-2019-0067	KCP&L GMO	FAC Prudency Review	Heat Rates, Plant Outages
EO-2019-0068	KCP&L	FAC Prudency Review	Heat Rates, Plant Outages
EO-2019-0049	Liberty-Empire Electric Company	Integrated Resource Plan	Misc.
EO-2019-0257	Ameren- Missouri	FAC Prudency Review	Heat Rates, Plant Outages

Jeremy Juliette

Educational and Employment Background and Credentials

I am currently employed as a Utility Regulatory Auditor I for the Missouri Public Service Commission (“Commission”). I began my employment with the Commission in April 2019. I earned a Bachelor of Science degree in Accounting from Western Governors University in July 2019.

As a Utility Regulatory Auditor, I perform rate audits and prepare miscellaneous filings as ordered by the Commission. In addition, I review all exhibits and testimony on assigned issues, develop accounting adjustments and issue positions which are supported by work papers and written testimony. For cases that do not require prepared testimony, I prepare Staff Recommendation Memorandums.

Cases I have been assigned are shown in the following table:

Company Name	Case Number	Case Type/Issue
Union Electric Company, d/b/a Ameren Missouri	ER-2019-0335	Electric Rate Case - Pending
Spire Missouri, Inc., d/b/a Spire	GO-2019-0357	Infrastructure System Replacement Surcharge (ISRS)
Spire Missouri, Inc., d/b/a Spire	GO-2019-0356	Infrastructure System Replacement Surcharge (ISRS)
Missouri American Water Company	WA-2019-0364 & SA-2019-0365	Certificate of Convenience and Necessity (CCN)

Robin Kliethermes

Present Position:

I am the Rate and Tariff Examination Manager of the Tariff and Rate Design Department, Commission Staff Division, of the Missouri Public Service Commission ("Commission"). I have held this position since July 16th, 2016. I have been employed by the Commission since March of 2012. In May of 2013, I presented on Class Cost of Service and Cost Allocation to the National Agency for Energy Regulation of Moldova ("ANRE") as part of the National Association of Regulatory Utility Commissioners ("NARUC") Energy Regulatory Partnership Program. I am also a member of the Electric Meter Variance Committee.

Educational Background and Work Experience:

I have a Bachelor of Science degree in Parks, Recreation and Tourism with a minor in Agricultural Economics from the University of Missouri – Columbia in 2008, and a Master of Science degree in Agricultural Economics from the same institution in 2010. Prior to joining the Commission, I was employed by the University of Missouri Extension as a 4-H Youth Development Specialist and County Program Director in Gasconade County.

Additionally, I completed two online classes through Bismarck State College: Energy Markets and Structures (ENRG 420) in December, 2014 and Energy Economics and Finance (ENRG 412) in May, 2015.

Previous Testimony of Robin Kliethermes

Case No.	Company	Type of Filing	Issue
ER-2012-0166	Ameren Missouri	Staff Report	Economic Considerations
ER-2012-0174	Kansas City Power & Light Company	Staff Report	Economic Considerations
ER-2012-0175	KCP&L Greater Missouri Operations Company	Staff Report	Economic Considerations & Large Power Revenues
ER-2012-0345	Empire District Electric Company	Staff Report	Economic Considerations, Non-Weather Sensitive Classes & Energy Efficiency
HR-2014-0066	Veolia Kansas City	Staff Report	Revenue by Class and Class Cost of Service
GR-2014-0086	Summit Natural Gas	Staff Report	Large Customer Revenues
GR-2014-0086	Summit Natural Gas	Rebuttal	Large Customer Revenues
EC-2014-0316	City of O'Fallon Missouri and City of Ballwin, Missouri v. Union Electric Company d/b/a Ameren Missouri	Staff Memorandum	Overview of Case
EO-2014-0151	KCP&L Greater Missouri Operations Company	Staff Recommendation	Renewable Energy Standard Rate Adjustment Mechanism (RESRAM)
ER-2014-0258	Ameren Missouri	Staff Report	Rate Revenue by Class, Class Cost of Service study, Residential Customer Charge
ER-2014-0258	Ameren Missouri	Rebuttal	Weather normalization adjustment to class billing units
ER-2014-0258	Ameren Missouri	Surrebuttal	Residential Customer Charge and Class allocations
ER-2014-0351	Empire District Electric Company	Staff Report	Rate Revenue by Class, Class Cost of Service study, Residential Customer Charge

cont'd Previous Testimony of
Robin Kliethermes

Case No.	Company	Type of Filing	Issue
ER-2014-0351	Empire District Electric Company	Rebuttal & Surrebuttal	Residential Customer, Interruptible Customers
ER-2014-0370	Kansas City Power & Light Company	Staff Report	Rate Revenue by Class, Class Cost of Service study, Residential Customer Charge
ER-2014-0370	Kansas City Power & Light Company	Rebuttal & Surrebuttal	Class Cost of Service, Rate Design, Residential Customer Charge
ER-2014-0370	Kansas City Power & Light Company	True-Up Direct & True-Up Rebuttal	Customer Growth & Rate Switching
EE-2015-0177	Kansas City Power & Light Company	Staff Recommendation	Electric Meter Variance Request
EE-2016-0090	Ameren Missouri	Staff Recommendation	Tariff Variance Request
EO-2016-0100	KCP&L Greater Missouri Operations Company	Staff Recommendation	RESRAM Annual Rate Adjustment Filing
ET-2016-0185	Kansas City Power & Light Company	Staff Recommendation	Solar Rebate Tariff Change
ER-2016-0023	Empire District Electric Company	Staff Report	Rate Revenue by Class, CCOS and Residential Customer Charge
ER-2016-0023	Empire District Electric Company	Rebuttal & Surrebuttal	Residential Customer Charge and CCOS
ER-2016-0156	KCP&L Greater Missouri Operations	Staff Report	Rate Revenue by Class, CCOS and Residential Customer Charge
ER-2016-0156	KCP&L Greater Missouri Operations	Rebuttal & Surrebuttal	Data Availability, Energy Efficiency Revenue Adj., Residential Customer Charge
ER-2016-0179	Ameren Missouri	Rebuttal	Blocked Usage
ER-2016-0285	Kansas City Power & Light Company	Rebuttal & Surrebuttal	Clean Charge Network Tariff, Rate Design
GR-2017-0215	Spire (Laclede Gas Company)	Staff Report, Rebuttal & Surrebuttal	Tariff Issues, Rate Design and Class Cost of Service

**cont'd Previous Testimony of
Robin Kliethermes**

Case No.	Company	Type of Filing	Issue
GR-2017-0216	Spire (Missouri Gas Energy)	Staff Report, Rebuttal & Surrebuttal	Tariff Issues, Rate Design and Class Cost of Service
EC-2018-0103	Kansas City Power & Light	Staff Report	Customer Complaint
EO-2015-0055	Ameren Missouri	Rebuttal	Flex-Pay Program
GR-2018-0013	Liberty	Staff Report	Class Cost of Service and Rate Design Report
ER-2018-0145	Kansas City Power & Light	Staff Report & Rebuttal & Surrebuttal	Tariff Issues, Rate Design, Revenue, Class Cost of Service
ER-2018-0146	KCP&L Greater Missouri Operations	Staff Report & Rebuttal & Surrebuttal	Tariff Issues, Rate Design, Revenue, Class Cost of Service
EO-2018-0211	Ameren Missouri	Staff Rebuttal Report	MEEIA Margin Rates
GO-2019-0059	Spire Missouri West	Staff Recommendation & Rebuttal	Weather Normalization Adjustment Rider (WNAR)
GO-2019-0058	Spire Missouri East	Staff Recommendation & Rebuttal	Weather Normalization Adjustment Rider (WNAR)
ET-2018-0132	Ameren Missouri	Surrebuttal	Risk Sharing Mechanism
ER-2019-0291	Ameren Missouri	Staff Recommendation	MEEIA EEIC rates
GR-2019-0077	Ameren Missouri	Staff Report, Rebuttal & Surrebuttal	Tariff Issues, Rate Design, Revenue, Class Cost of Service
EO-2019-0132	KCPL and GMO	Staff Rebuttal Report	MEEIA DSIM mechanism, Tariff Issues

JASON KUNST, CPA

Utility Regulatory Auditor IV

Educational Background and Experience

I graduated from the University of Missouri – St. Louis with a Bachelor's of Science degree in Accounting in December 2007. I am a Certified Public Accountant (CPA) licensed in the state of Missouri.

Prior to joining the Commission in May 2014, I was employed as an Unemployment Insurance Auditor II with the Missouri Department of Labor and Industrial Relations, Division of Employment Security. As an Unemployment Insurance Auditor, I reviewed employer's books, payroll records, and other related records to determine accuracy and compliance with Missouri Employment Security Law.

Jason Kunst, CPA

Case Summary

Company	Case	Issue
Ameren Missouri	ER-2014-0258	Formal Rate Case: Advertising, Misc. Expenses, Board of Directors Fees, Dues & Donations, Property Taxes, Property Tax Refund Tracker, Customer Accounting Expense to reflect new full page bill format, Plant in Service, Depreciation Reserve, Materials & Supplies, Prepayments, Customer Deposits, Customer Advances, Interest on Customer Deposits
Laclede Gas Company	GO-2015-0269	ISRS Filing
Missouri American Water Company	WR-2015-0301 SR-2015-0302	Formal Rate Case: Payroll & Related Expenses, Employee Benefits, Tank Painting and Inspection Expense Tracker, Waste Disposal, Transportation Expenses, Leases & Rents, Incentive Compensation, Severance Expense, PSC Assessment
Ameren Missouri	ER-2016-0179	Formal Rate Case: Payroll & Related Expenses, Employee Benefits, Incentive Compensation, Severance Expense, Cyber Security Costs, Board of Directors Fees, Dues & Donations, Misc. Expenses, Advertising, Rate Case Expense, Outside Auditor Fees, Scada Revenues & Expenses, Taum Sauk Failure Expenses

Jason Kunst, CPA
Cont'd Case Summary

Company	Case	Issue
Spire Missouri	GR-2017-0215 GR-2017-0216	Formal Rate Case: Forest Park Property Sale, Rents and Leases, Outside Services, Amortization Expense, NewBlue Software, Credit Card Transaction Fees, Rebranding Costs
Liberty Utilities Corp.	GR-2018-0013	Formal Rate Case: Revenues, Capitalized Depreciation, Rate Case Expense, Cash Working Capital, Outside Services, Postage Expense
Ameren Missouri	EA-2018-0202	CCN & RESRAM Application
Missouri American Water Corporation	WO-2018-0373	ISRS Filing
Ameren Missouri	EA-2019-0021	CCN
Ameren Missouri	GR-2019-0077	Formal Rate Case: Allocations, Payroll & Related Expenses, Employee Benefits, Facilities Costs, Allocated Software, Property Taxes, Board of Directors Expenses, Incentive Compensation, Outside Services, Cash Working Capital, Rate Case Expense

**CREDENTIALS AND CASE PARTICIPATION OF
SHAWN E. LANGE**

PRESENT POSITION:

I am a Utility Regulatory Engineer I in the Engineering Analysis Department, Industry Analysis Division, of the Missouri Public Service Commission.

EDUCATIONAL BACKGROUND AND WORK EXPERIENCE:

In December 2002, I received a Bachelor of Science Degree in Mechanical Engineering from the University of Missouri, at Rolla now known as the Missouri University of Science and Technology. I joined the Commission Staff in January 2005. I am a registered Professional Engineer in the State of Missouri. I have spoke at NCDC's workshop on alternative climate normals.

TESTIMONY FILED:

Case Number	Utility	Testimony	Issue
ER-2005-0436	Aquila Inc.	Direct	Weather Normalization
		Rebuttal	Weather Normalization
		Surrebuttal	Weather Normalization
ER-2006-0314	Kansas City Power & Light Company	Direct	Weather Normalization
		Rebuttal	Weather Normalization
ER-2006-0315	Empire District Electric Company	Direct	Weather Normalization
		Surrebuttal	Weather Normalization
ER-2007-0002	Union Electric Company d/b/a AmerenUE	Direct	Weather Normalization
ER-2007-0004	Aquila Inc.	Direct	Weather Normalization
ER-2007-0291	Kansas City Power & Light Company	Staff Report	Weather Normalization
		Rebuttal	Weather Normalization
ER-2008-0093	Empire District Electric Company	Staff Report	Weather Normalization
ER-2008-0318	Union Electric Company d/b/a AmerenUE	Staff Report	Weather Normalization
ER-2009-0089	Kansas City Power & Light Company	Staff Report	Net System Input

*cont'd \ Case Participation of
Shawn E. Lange*

Case Number	Utility	Testimony	Issue
ER-2009-0090	KCP&L Greater Missouri Operations Company	Staff Report	Net System Input
ER-2010-0036	Union Electric Company d/b/a AmerenUE	Staff Report	Net System Input
ER-2010-0130	Empire District Electric Company	Staff Report	Variable Fuel Costs
		Surrebuttal	Variable Fuel Costs
ER-2010-0355	Kansas City Power & Light Company	Staff Report	Variable Fuel Costs
ER-2010-0356	KCP&L Greater Missouri Operations Company	Staff Report	Engineering Review-Sibley 3 SCR
ER-2011-0004	Empire District Electric Company	Staff Report	Variable Fuel Costs
ER-2011-0028	Union Electric Company d/b/a Ameren Missouri	Staff Report	Net System Input
ER-2012-0166	Union Electric Company d/b/a Ameren Missouri	Staff Report	Weather Normalization
		Surrebuttal	Weather Normalization Maryland Heights In-Service
ER-2012-0174	Kansas City Power & Light Company	Staff Report	Weather Normalization Net System Input Variable Fuel Costs
		Surrebuttal	Weather Normalization
ER-2012-0175	KCP&L Greater Missouri Operations Company	Staff Report	Weather Normalization Net System Input
		Surrebuttal	Weather Normalization
ER-2012-0345	Empire District Electric Company	Rebuttal	Interim Rates
		Staff Report	Weather Normalization
EA-2014-0223	Complaint of Noranda Aluminum	Rebuttal	Weather Normalization
EA-2014-0207	Grain Belt Express CCN	Rebuttal	Safety Interconnection Studies
		Surrebuttal	Environmental Impacts

*cont'd \ Case Participation of
Shawn E. Lange*

Case Number	Utility	Testimony	Issue
ER-2014-0258	Union Electric Company d/b/a Ameren Missouri	Staff Report	Variable Fuel Costs Net System Input
ER-2014-0351	Empire District Electric Company	Staff Report	Variable Fuel Costs Net System Input
ER-2014-0370	Kansas City Power & Light Company	Staff Report	Net System Input Variable Fuel Costs
		True-up Direct	Variable Fuel Costs La Cygne In-service
EA-2015-0146	ATXI CCN	Rebuttal	Certificates of Convenience/Feasibility Analysis
		Surrebuttal	
ER-2016-0023	Empire District Electric Company	Staff Report	Net System Input Variable Fuel Costs
		Surrebuttal	Variable Fuel Costs
ER-2016-0179	Union Electric Company d/b/a Ameren Missouri	Staff Report	Variable Fuel Costs
EA-2016-0385	Grain Belt Express CCN	Rebuttal	Safety Interconnection Studies
		Surrebuttal	Environmental Impacts
ER-2018-0145	Kansas City Power & Light Company	Staff Report	Variable Fuel Costs Market Prices
		Rebuttal	Variable Fuel Costs Market Prices
		True-up Direct	Variable Fuel Costs Market Prices
EA-2018-0327	ATXI CCN	Rebuttal	Certificates of Convenience/Feasibility Analysis
EA-2019-0021	Ameren CCN	Staff Report	Certificates of Convenience/Feasibility Analysis/
EA-2019-0010	Empire District Electric Company CCN	Staff Report	Certificates of Convenience/Feasibility Analysis/

Educational and Employment Background and Credentials

of
Karen Lyons

I am currently employed as a Utility Regulatory Auditor V for the Missouri Public Service Commission (“Commission”). I was employed by the Commission in April 2007. Previously, I was employed by AT&T as a Regulatory Complaint Manager from December 1999 to February 2007. In that capacity I was responsible for addressing consumer and business complaints filed with various state and federal regulatory agencies. I earned a Bachelor of Science degree in Management Accounting and a Master’s in Business Administration from Park University.

As a Utility Regulatory Auditor V, I perform rate audits and prepare miscellaneous filings as ordered by the Commission. In addition, I review all exhibits and testimony on assigned issues, develop accounting adjustments and issue positions which are supported by workpapers and written and oral testimony. For cases that do not require prepared testimony, I prepare Staff Recommendation Memorandums.

Cases I have been assigned are shown in the following table:

Date Filed	Case/Tracking Number	Company Name - Issue
12/04/2019-Direct	ER-2019-0335	Union Electric Company, d/b/a Ameren Missouri (Electric Rate Case)-Pending
9/27/2019 Proceedings Stayed	WA-2019-0364 & SA- 2019-0365	Missouri American Water Company-Certificate of Convenience and Necessity (CCN)
10/24/2019 Dismissed	WA-2019-0366 & SA- 2019-0367	Missouri American Water Company-Certificate of Convenience and Necessity (CCN)
9/13/2019 Staff Memorandum 9-27-2019-Direct	GO-2019-0357 (Contested)	Spire West-Infrastructure System Replacement Surcharge (ISRS)
9/13/2019 Staff Memorandum 9/27/2019-Direct	GO-2019-0356 (Contested)	Spire East-Infrastructure System Replacement Surcharge (ISRS)

Date Filed	Case/Tracking Number	Company Name - Issue
3/26/2019 Staff Memorandum	WO-2019-0184 (Contested)	Missouri American Water Company (ISRS)
3/26/2019 Staff Memorandum	SA-2019-0161	United Services, Inc (CCN)
2/11/2019 Staff Memorandum	SA-2019-0183	Missouri American Water Company (CCN)
6/19/2018-Direct 7/27/2018-Rebuttal 9/4/2018-Surrebuttal and True-up Direct	ER-2018-0145 (Stipulated)	Kansas City Power & Light Company (Electric Rate Case)
6/19/2018-Direct 7/27/2018-Rebuttal 9/4/2018-Surrebuttal and True-up Direct	ER-2018-0146 (Stipulated)	KCP&L Greater Missouri Operations Company (Electric Rate Case)
9/08/2017-Direct 10/17/2017-Rebuttal 11/21/2017-Surrebuttal 11/28/2017-True-Up Direct	GR-2017-0215 and GR- 2017-0216-Contested	Laclede Gas and Missouri Gas Energy (Gas Rate Case)
11/30/2016-Direct 12/30/2016-Rebuttal 1/27/2017-Surrebuttal 3/01/2017-True-Up Direct 3/10/2017-True-Up Rebuttal	ER-2016-0285-Contested	Kansas City Power & Light Company (Electric Rate Case)
7/15/2016-Direct 8/15/2016-Rebuttal 9/02/2016-Surrebuttal	ER-2016-0156-Stipulated	KCP&L Greater Missouri Operations Company (Electric Rate Case)
2/09/2016-Deposition	EA-2015-0256-Contested	KCP&L Greater Missouri Operations Company (Solar CCN)
12/29/2015 Staff Memorandum	WO-2016-0098	Missouri American Water Company- Infrastructure Service Replacement Surcharge (ISRS)

Date Filed	Case/Tracking Number	Company Name - Issue
4/02/2015-Direct 5/07/2015-Rebuttal 6/05/2015-Surrebuttal 7/15/2015-True Up Rebuttal	ER-2014-0370-Contested	Kansas City Power & Light Company (Electric Rate Case)
5/01/2014-Direct	HR-2014-0066-Stipulated	Veolia Energy Kansas City, Inc. (Steam Rate Case)
1/23/2014-Direct 4/01/2014-Surrebuttal	GR-2014-0007-Stipulated	Missouri Gas Energy Company (Gas Rate Case)
4/09/2013 Staff Memorandum	GO-2013-0391	Missouri Gas Energy - Infrastructure Service Replacement Surcharge (ISRS)
2/01/13 Staff Memorandum	WM-2013-0329	Bilyeu Ridge Water Company, LLC (Water Sale Case)
8/09/2012-Direct 9/12/12-Rebuttal 10/10/12-Surrebuttal	ER-2012-0175-Contested	KCP&L Greater Missouri Operations Company (Electric Rate Case)
8/02/2012-Direct 9/05/2012-Rebuttal 10/08/2012-Surrebuttal	ER-2012-0174-Contested	Kansas City Power & Light Company (Electric Rate Case)
4/20/2012 Staff Memorandum	WM-2012-0288	Valley Woods Water Company, Inc. (Water Sale Case)
1/06/2012 Staff Memorandum	GO-2012-0144	Missouri Gas Energy - Infrastructure Service Replacement Surcharge (ISRS)
8/08/2011-Direct	HR-2011-0241-Stipulated	Veolia Energy Kansas City, Inc. (Steam Rate Case)
11/17/2010-Direct 12/15/2010-Rebuttal 1/05/2011-Surrebuttal	ER-2010-0356-Contested	KCP&L Greater Missouri Operations Company (Electric Rate Case)
11/10/2010-Direct 12/08/2010-Rebuttal 1/05/2011-Surrebuttal	ER-2010-0355-Contested	Kansas City Power & Light Company (Electric Rate Case)
12/22/2011 Staff Memorandum	SA-2010-0219	Canyon Treatment Facility, LLC (Certificate Case)

cont'd Karen Lyons

Date Filed	Case/Tracking Number	Company Name - Issue
6/07/2010 Staff Memorandum	WR-2010-0202	Stockton Water Company (Water Rate Case)
4/02/2010 Staff Memorandum	SR-2010-0140	Valley Woods Water Company (Water Rate Case)
4/02/2010 Staff Memorandum	WR-2010-0139	Valley Woods Water Company (Sewer Rate Case)
1/14/2010-Direct	SR-2010-0110	Lake Region Water and Sewer (Sewer Rate Case)
1/14/2010-Direct	WR-2010-0111	Lake Region Water and Sewer (Water Rate Case)
8/12/2009-Direct	GR-2009-0355-Stipulated	Missouri Gas Energy (Gas Rate Case)
2/13/2009-Direct 3/13/2009-Rebuttal 4/09/2009-Surrebuttal	ER-2009-0090-Global Settlement	KCP&L Greater Missouri Operations Company (Electric Rate Case)
2/13/2009-Direct 3/13/2009-Rebuttal 4/09/2009-Surrebuttal	HR-2009-0092-Global Settlement	KCP&L Greater Missouri Operations Company (Steam Rate Case)
2/11/2009-Direct 3/11/2009-Rebuttal 4/07/2009-Surrebuttal	ER-2009-0089-Global Settlement	Kansas City Power & Light Company (Electric Rate Case)
8/01/2008	HR-2008-0300-Stipulated	Trigen Kansas City Energy Corporation (Steam Rate Case)
4/28/2008	QW-2008-0003	Spokane Highlands Water Company (Water Rate Case)
12/17/2007	GO-2008-0113	Missouri Gas Energy - Infrastructure Service Replacement Surcharge (ISRS)

Keith Majors

Educational and Employment Background and Credentials

I am currently employed as a Utility Regulatory Auditor IV for the Missouri Public Service Commission (Commission). I was employed by the Commission in June 2007. I earned a Bachelor of Science degree in Accounting from Truman State University in May 2007.

As a Utility Regulatory Auditor, I perform rate audits and prepare miscellaneous filings as ordered by the Commission. In addition, I review all exhibits and testimony on assigned issues, develop accounting adjustments and issue positions which are supported by workpapers and written testimony. For cases that do not require prepared testimony, I prepare Staff Recommendation Memorandums.

Cases I have been assigned are shown in the following table:

Utility	Case Number	Issues	Exhibit
Ameren Missouri - Electric	ER-2019-0335	Ameren Services Allocations and Affiliate Transaction	Staff Report
KCP&L & KCP&L GMO	ER-2018-0145 & ER-2018-0146	Synergy and Transition Costs Analysis, Transmission Revenue and Expense	Staff Report Rebuttal Surrebuttal
Laclede Gas and Missouri Gas Energy	GR-2017-0215 & GR-2017-0216	Synergy and Transition Costs Analysis, Corporate Allocations	Staff Report Rebuttal Surrebuttal
KCP&L & KCP&L GMO	ER-2016-0156	Income Taxes, Pension & OPEB	Staff Report Rebuttal Surrebuttal
KCP&L & KCP&L GMO	EC-2015-0309	Affiliate Transactions, Allocations	Surrebuttal Testimony
KCP&L	ER-2014-0370	Income Taxes, Pension & OPEB, Revenues	Staff Report Rebuttal Surrebuttal
KCP&L	EU-2015-0094	DOE Nuclear Waste Fund Fees	Direct Testimony
KCP&L	EU-2014-0255	Construction Accounting	Rebuttal Testimony
Veolia Kansas City	HR-2014-0066	Income Taxes, Revenues, Corporate Allocations	Staff Report
Missouri Gas Energy	GR-2014-0007	Corporate Allocations, Pension & OPEB, Incentive Compensation, Income Taxes	Staff Report Rebuttal Surrebuttal
Missouri Gas Energy ISRS	GO-2013-0391	ISRS	Staff Memorandum

continued Keith Majors

Utility	Case Number	Issues	Exhibit
KCP&L & KCP&L GMO	ER-2012-0174 & ER-2012-0175	Acquisition Transition Costs, Fuel, Legal and Rate Case Expense	Staff Report Rebuttal Surrebuttal
Missouri Gas Energy ISRS	GO-2011-0269	ISRS	Staff Memorandum
Noel Water Sale Case	WO-2011-0328	Sale Case Evaluation	Staff Recommendation
KCP&L & KCP&L GMO	ER-2010-0355 & ER-2010-0356	Acquisition Transition Costs, Rate Case Expense	Staff Report Rebuttal Surrebuttal
KCP&L Construction Audit & Prudence Review	EO-2010-0259	AFUDC, Property Taxes	Staff Report
KCP&L, KCP&L GMO, & KCP&L GMO – Steam	ER-2009-0089, ER-2009-0090, & HR-2009-0092	Payroll, Employee Benefits, Incentive Compensation	Staff Report Rebuttal Surrebuttal
Trigen Kansas City	HR-2008-0300	Fuel Inventories, Rate Base Items, Rate Case Expense, Maintenance	Staff Report
Spokane Highlands Water Company	WR-2008-0314	Plant, CIAC	Staff Recommendation
Missouri Gas Energy ISRS	GO-2008-0113	ISRS	Staff Memorandum

Antonija Nieto

Educational and Employment Background and Credentials

I am currently employed as a Utility Regulatory Auditor for the Missouri Public Service Commission ("Commission"). Previously I was employed by Lauterbach, Borschow and Company, P.C. in El Paso, TX as an auditor specializing in financial institutions audits from January 2008 to November 2009. I earned a Bachelor of Accounting from New Mexico State University in December 2006 and a Master of Accounting with minor in Management, also from New Mexico State University in December 2007. I have been employed by the Commission since October 2016.

As a Utility Regulatory Auditor, I perform rate audits and prepare miscellaneous filings for consideration by the Commission. In addition, I review all exhibits and testimony on assigned issues, develop accounting adjustments and issue positions which are supported by workpapers and written testimony. For cases that do not require prepared testimony, I prepare Staff Recommendation Memorandums.

Cases in which I have participated and the scope of my contributions are listed below:

Case/Tracking Number	Company Name- Type of Case; Issues
ER-2019-0335	Ameren Missouri - pending
GO-2019-0356 GO-2019-0357	Spire Inc. Infrastructure System Replacement Surcharge (ISRS)
WA-2019-0364 SA-2019-0365	Missouri American Water Company Certificate of Convenience and Necessity (CCN)
WO-2019-0184	Missouri American Water Company Infrastructure System Replacement Surcharge (ISRS) Work Order review, Reconciliation
SA-2019-0161	United Services, Inc. Certificate of Convenience and Necessity Plant buildout, Direct Expenses

Antonija Nieto

Case/Tracking Number	Company Name- Type of Case; Issues
ER-2018-0145	Kansas City Power & Light and Greater Missouri Energy Company Advertising, Bad Debt Expense, Revenues, Customer Advances, Customer Deposits, Customer Growth, Dues and Donations, Material and Supplies, Other Revenues, Prepayments, Forfeited Discounts annualization, Greater Missouri Energy Company EMS Run, Payroll expenses, Payroll Taxes, Employee Benefits
GR-2017-0215 GR-2017-0216	Laclede Gas and Missouri Gas Energy Payroll, Payroll Taxes, Employee Benefits, Non-Labor Maintenance, A&G and O&M Cost Analysis
WR-2017-0139	Stockton Hills Water Company Payroll, Other Expenses
ER-2016-0285	Kansas City Power & Light Company EMS Run, Insurance expense, Amortization, PSC Assessment, Lease expense

Joseph P. Roling

Present Position:

I am a Regulatory Economist in the Tariff and Rate Design Unit, Industry Analysis Division, of the Missouri Public Service Commission. I have been employed by the Missouri Public Service Commission since March of 2016.

Educational Background and Work Experience:

I have a Bachelor of Science degree in Business Administration, Finance & Banking with a minor in Economics from the University of Missouri – Columbia in 1991, and a Master of Business Administration from Lincoln University in 1995. Prior to joining the Commission, I was employed in the Financial Service Industry.

Additionally, I completed Financial Planning Certificate Program from Bryant University in October, 2015.

Regulatory Training while at PSC:

- 5/19/16 – Carbon Markets 101 – Keys to Effective Design & Management
- 6/27/16 – Evaluation, Measurement & Verification (EM&V) for Energy Efficiency
- 6/29/16 – Long Term Gas Hedging Why and How
- 7/2/16 – Setting Baselines for Planning & Evaluation of Efficiency Programs EMV
- 8/25/16 - Leveraging Power Markets to Achieve a Reliable, Least-Cost Transition to a Low-Carbon Power System Regulatory Assistance Project
- 9/21/16 – FRI Symposium Attendance - "Managing the Triple Threat to Public Utility Profitability: Safety, Reliability & Affordability."
- 10/13/16 - Gas Efficiency Programs – What does it take to pass cost-effectiveness tests?
- 11/3/16 - More is Less - Environmentally Beneficial Electrification

cont'd Joseph P. Roling

cont'd Regulatory Training while at PSC:

01-17-17 Harness the Momentum of Power Sector Transformation - Regulatory Assistance Project (RAP) Webinar

01-25-17 New Study on Demand Charge Savings from Residential Solar – Electric Markets & Policy Group, Lawrence Berkeley National Laboratory.

01-31-17 Energy Efficiency - Consistency and Coordination of Energy Efficiency EM&V and Reporting

02-21-17 Assessment of Benefits Derived from Improved Reliability & Resiliency in Utility-owned Microgrid

03-01-17 Flexible & Customizable – Designing Decoupling for your State Regulatory Assistance Project

03-23-17 Part 1 Lessons Learned from Energy Efficiency Programs

03-30-17 Part 2 Lessons Learned from Energy Efficiency Programs

11-17-17 MISO 101 Overview for MPSC

02-06-18 One Size Does Not Fit All – Complexities, Use Case, Trends in Energy Storage

02-13-18 Clean Energy States Alliance-State of the US Energy Storage Industry 2017 Year on Review

05-02-18 Income Trends of Residential Solar Adopters

cont'd Joseph P. Roling

Previous filed Testimony of Joseph P. Roling

Case No.	Company	Type of Filing	Issue
ER-2019-0375	Kansas City Power & Light Company	Staff Recommendation	MEEIA
ER-2019-0397	KCPL Greater Missouri Operations Company	Staff Recommendation	MEEIA
GR-2019-0077	Ameren Missouri	Cost of Service Report	Revenues
EC-2018-0066	Ameren Missouri	Tariff Investigation Report	Customer Complaint
EC-2018-0097	Ameren Missouri	Tariff Investigation Report	Customer Complaint
GR-2018-0013	Liberty Utilities	Cost of Service Report	Revenues
GC-2017-0348	Spire Missouri, Inc., d/b/a Spire (Laclede Gas Company and Missouri Gas Energy)	Tariff Investigation Report	Customer Complaint
GR-2017-0215 and GR-2017-0216	Spire Missouri, Inc., d/b/a Spire (Laclede Gas Company and Missouri Gas Energy)	Cost of Service Report	Revenues
ER-2016-0179	Ameren Missouri	Cost of Service / Revenue Requirement Report	Revenues

Jeffrey Smith
Utility Regulatory Auditor
Financial Analysis

EDUCATION

Bachelors of Science Criminal Justice
Central Missouri State University, Warrensburg, MO – July 2007

Master of Science Criminal Justice
University of Central Missouri, Warrensburg, MO – December 2010

Post-Bachelors of Science Economics
University of Central Missouri, Warrensburg, MO – December 2015

Post-Bachelors of Science and Business Administration Finance
University of Central Missouri, Warrensburg, MO – December 2016

Certified Rate of Return Analyst
Society of Regulatory and Financial Analysts, Richmond, VA – April 2017

Certificate in Public Policy
Truman School of Public Affairs, University of Missouri, Columbia, MO – December 2018

Candidate in the CFA Institute CFA Program
CFA Institute, Charlottesville, VA
Passed CFA Level 1 Exam – December 2017

PROFESSIONAL EXPERIENCE

Missouri Public Service Commission
Utility Regulatory Auditor III
August 2018 – Present
Utility Regulatory Auditor II
August 2017 – August 2018
Utility Regulatory Auditor I
August 2016 – August 2017

CASE INVOLVEMENT

MO PSC	Utility	Subject
SR-2017-0099	Seges Partners Mobile Home Park, LLC	Cost of Capital
WF-2017-0110	Terre Du Lac Utilities	Finance Authority
SR-2017-0130	Gladlo Water & Sewer Company	Cost of Capital
WR-2017-0139	Stockton Hills Water Company	Cost of Capital
WR-2017-0143	Terre Du Lac Utilities	Cost of Capital
WF-2017-0143	Terre Du Lac Utilities	Finance Authority
GR-2017-0215	Laclede Gas Company	Assisted in Developing Cost of Capital Schedules
GR-2017-0216	Missouri Gas Energy	Assisted in Developing Cost of Capital Schedules
EF-2017-0242	Kansas City Power & Light Company	Finance Authority
WR-2017-0285	Missouri-American Water Company	Cost of Capital
WF-2017-0349	Missouri-American Water Company	Finance Authority
EO-2018-0062	Kansas City Power & Light Company	Triennial Decommissioning Trust Fund Adequacy
EF-2018-0114	Kansas City Power & Light Company	Finance Authority
ER-2018-0145	Kansas City Power & Light	Cost of Capital
ER-2018-0146	Kansas City Power & Light Greater Missouri Operations	Cost of Capital

CASE INVOLVEMENT

MO PSC	Utility	Subject
EF-2018-0314	Kansas City Power & Light	Finance Authority
WR-2018-0356	Branson Cedars Resort Utility Company, LLC	Cost of Capital
EA-2019-0010	Empire District Electric Company	Certificate of Convenience and Necessity
GR-2019-0077	Union Electric / dba Ameren Missouri Gas	Cost of Capital
HM-2020-0039	Veolia Energy Kansas City	Merger and Acquisition
ER-2019-0335	Union Electric / dba Ameren Missouri Electric	Cost of Capital

Michael L. Stahlman

Education

- 2009 M. S., Agricultural Economics, University of Missouri, Columbia.
2007 B.A., Economics, Summa Cum Laude, Westminster College, Fulton, MO.

Professional Experience

- 2010 - Regulatory Economist, Missouri Public Service Commission
2007 – 2009 Graduate Research Assistant, University of Missouri
2008 Graduate Teaching Assistant, University of Missouri
2007 American Institute for Economic Research (AIER) Summer Fellowship Program
2006 Price Analysis Intern, Food and Agricultural Policy Research Institute (FAPRI), Columbia, MO
2006 Legislative Intern for State Representative Munzlinger
2005 – 2006 Certified Tutor in Macroeconomics, Westminster College, Fulton, MO
1998 – 2004 Engineering Watch Supervisor, United States Navy

Expert Witness Testimony

- Union Electric Company d/b/a AmerenUE GR-2010-0363
In the Matter of Union Electric Company d/b/a AmerenUE for Authority to File Tariffs Increasing Rates for Natural Gas Service Provided to Customers in the Company's Missouri Service Area
- Union Electric Company d/b/a Ameren Missouri GT-2011-0410
In the Matter of the Union Electric Company's (d/b/a Ameren Missouri) Gas Service Tariffs Removing Certain Provisions for Rebates from Its Missouri Energy Efficient Natural Gas Equipment and Building Shell Measure Rebate Program
- KCP&L Great Missouri Operations Company EO-2012-0009
In the Matter of KCP&L Greater Missouri Operations Company's Notice of Intent to File an Application for Authority to Establish a Demand-Side Programs Investment Mechanism
- Union Electric Company d/b/a Ameren Missouri EO-2012-0142
In the Matter of Union Electric Company d/b/a Ameren Missouri's Filing to Implement Regulatory Changes Furtherance of Energy Efficiency as Allowed by MEEIA
- Kansas City Power & Light Company EO-2012-0323
In the Matter of the Resource Plan of Kansas City Power & Light Company
- KCP&L Great Missouri Operations Company EO-2012-0324
In the Matter of the Resource Plan of KCP&L Greater Missouri Operations Company
- Kansas City Power & Light Company, KCP&L Great Missouri Operations Company, and Transource Missouri EA-2013-0098
EO-2012-0367
In the Matter of the Application of Transource Missouri, LLC for a Certificate of Convenience and Necessity Authorizing it to Construct, Finance, Own, Operate, and Maintain the Iatan-Nashua and Sibley-Nebraska City Electric Transmission Projects

cont'd Expert Witness Testimony
Michael L. Stahlman

Kansas City Power & Light Company	EO-2012-0135
KCP&L Great Missouri Operations Company	EO-2012-0136
In the Matter of the Application of Kansas City Power & Light Company [KCP&L Great Missouri Operations Company] for Authority to Extend the Transfer of Functional Control of Certain Transmission Assets to the Southwest Power Pool, Inc.	
Kansas City Power & Light Company	EU-2014-0077
KCP&L Great Missouri Operations Company	
In the Matter of the Application of Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company for the Issuance of an Accounting Authority Order relating to their Electrical Operations and for a Contingent Waiver of the Notice Requirement of 4 CSR 240-4.020(2)	
Kansas City Power & Light Company	EO-2014-0095
In the Matter of Kansas City Power & Light Company's Notice of Intent to File an Application for Authority To Establish a Demand-Side Programs Investment Mechanism	
Veolia Energy Kansas City, Inc	HR-2014-0066
In the Matter of Veolia Energy Kansas City, Inc for Authority to File Tariffs to Increase Rates	
Grain Belt Express Clean Line, LLC	EA-2014-0207
In the Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity Authorizing It to Construct, Own, Operate, Control, Manage, and Maintain a High Voltage, Direct Current Transmission Line and an Associated Converter Station Providing an Interconnection on the Maywood - Montgomery 345 kV Transmission Line	
Union Electric Company d/b/a Ameren Missouri	ER-2014-0258
In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariff to Increase Its Revenues for Electric Service	
Empire District Electric Company	ER-2014-0351
In the Matter of The Empire District Electric Company for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in the Company's Missouri Service Area	
Kansas City Power & Light Company	ER-2014-0370
In the Matter of Kansas City Power & Light Company's Request for Authority to Implement a General Rate Increase for Electric Service	
Kansas City Power & Light Company	EO-2014-0240
In the Matter of Kansas City Power & Light Company's Filing for Approval of Demand-Side Programs and for Authority to Establish a Demand-Side Programs Investment Mechanism	
KCP&L Great Missouri Operations Company	EO-2014-0241
In the Matter of KCP&L Greater Missouri Operations Company's Filing for Approval of Demand-Side Programs and for Authority to Establish a Demand-Side Programs Investment Mechanism	

cont'd Expert Witness Testimony
Michael L. Stahlman

- Ameren Transmission Company of Illinois EA-2015-0146
In the Matter of the Application of Ameren Transmission Company of Illinois for Other Relief or, in the Alternative, a Certificate of Public Convenience and Necessity Authorizing it to Construct, Install, Own, Operate, Maintain and Otherwise Control and Manage a 345,000-volt Electric Transmission Line from Palmyra, Missouri to the Iowa Border and an Associated Substation Near Kirksville, Missouri
- Empire District Electric Company ER-2016-0023
In the Matter of The Empire District Electric Company's Request for Authority to Implement a General Rate Increase for Electric Service
- KCP&L Great Missouri Operations Company ER-2016-0156
In the Matter of KCP&L Greater Missouri Operations Company's Request for Authority to Implement a General Rate Increase for Electric Service
- Kansas City Power & Light Company ER-2016-0285
In the Matter of Kansas City Power & Light Company's Request for Authority to Implement A General Rate Increase for Electric Service
- Union Electric Company d/b/a Ameren Missouri ER-2016-0179
In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariff to Increase Its Revenues for Electric Service
- Grain Belt Express Clean Line, LLC EA-2016-0358
In the Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity Authorizing it to Construct, Own, Operate, Control, Manage and Maintain a High Voltage, Direct Current Transmission Line and an Associated Converter Station Providing an Interconnection on the Maywood-Montgomery 345kV transmission line.
- Spire Missouri, Inc. GR-2017-0215 and GR-2017-0216
In the Matter of Spire Missouri, Inc.'s Request to Increase Its Revenues for Gas Service
- Liberty Utilities GR-2018-0013
In the Matter of Liberty Utilities (Midstates Natural Gas) Corp. d/b/a Liberty Utilities' Tariff Revisions Designed to Implement a General Rate Increase for Natural Gas Service in the Missouri Service Areas of the Company
- Spire Missouri, Inc. GO-2019-0058 and GO-2019-0059
In the Matter of Spire Missouri, Inc. d/b/a Spire's Request to Decrease [Increase] WNAR
- Grain Belt Express Clean Line LLC EM-2019-0150
Invenergy Transmission LLC
Invenergy Investment Company LLC
In the Matter of the Joint Application of Invenergy Transmission LLC, Invenergy Investment Company LLC, Grain Belt Express Clean Line LLC and Grain Belt Express Holding LLC for an Order Approving the Acquisition by Invenergy Transmission LLC of Grain Belt Express Clean Line LLC

cont'd Expert Witness Testimony
Michael L. Stahlman

Union Electric Company d/b/a Ameren Missouri
In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to
Increase its Revenues for Natural Gas Service

GR-2019-0077

Selected Manuscripts

Stahlman, Michael and Laura M.J. McCann. "Technology Characteristics, Choice Architecture and Farmer Knowledge: The Case of Phytase." *Agriculture and Human Values* (2012) 29: 371-379.

Stahlman, Michael. "The Amoral of Signals." Awarded in top 50 authors for SEVEN Fund essay competition, "The Morality of Profit."

Selected Posters

Stahlman, Michael, Laura M.J. McCann, and Haluk Gedikoglou. "Adoption of Phytase by Livestock Farmers." Selected poster at the American Agricultural Economics Association Annual Meeting, Orlando, FL, July 27-29, 2008. Also presented at the USDA/CSREES Annual Meeting in St. Louis, MO in February 2009.

McCann, Laura, Haluk Gedikoglu, Bob Broz, John Lory, Ray Massey, and Michael Stahlman. "Farm Size and Adoption of BMPs by AFOs." Selected poster at the 5th National Small Farm Conference in Springfield, IL in September 2009.

Non-Peer-Reviewed Works

Poole-King, Contessa, Henry Warren, and Michael Stahlman. "Forecasters Predicting Cold, Wet Winter For Most Of Midwest." *PSConnection* (Fall 2013) 3(7):3-4.

Poole-King, Contessa, Henry Warren, and Michael Stahlman. "Low Income Weatherization Programs Provides Services To Help Consumers." *PSConnection* (Fall 2013) 3(7):5-6.

LISA WILDHABER

CAREER EXPERIENCE

Missouri Public Service Commission, Jefferson City, Missouri

Utility Regulatory Auditor III June 25, 2018 – Present

Perform rate audits and prepare miscellaneous filings as ordered by the Commission. Review all exhibits and testimony on assigned issues from the most recent previous case and the current case. Develop accounting adjustments and issue positions which are supported by workpapers and written testimony. Prepare Staff Recommendation Memorandum for filings that do not require prepared testimony.

Division of Professional Registration—Missouri State Board of Embalmers & Funeral Directors, Jefferson City, Missouri

Examination Supervisor March 2011 – June 2018

Division of Professional Registration—Missouri Real Estate Commission, Jefferson City, Missouri

Examination Supervisor March 2002 – March 2011

Meyer Electric Company, Jefferson City, Missouri

Accountant October 1998 – May 2000

Missouri Department of Transportation, Jefferson City, Missouri

Financial Business Analyst May 1997 - January 2001

Buehler & Bates, CPA's, Jefferson City, Missouri

Senior Auditor June 1984 - May 1997

EDUCATION

Bachelor of Science, Accounting (1984)

Northeast Missouri State University (Truman State), Kirksville, MO

OTHER CERTIFICATIONS

**Certified Public Accountant license
Real Estate Salesperson license
Certified Fraud Examiner certification**

CASE PROCEEDING PARTICIPATION

LISA M. WILDHABER

PARTICIPATION		TESTIMONY
COMPANY	CASE NO.	ISSUES
Empire District Electric Company	EO-2020-0094	FAC True-Up Filing
Empire District Electric Company	ER-2020-0093	FAC Filing
Empire District Electric Company	EO-2020-0059	FAC Prudence Review
KCPL	EO-2020-0026	FAC True-Up Filing
KCPL	ER-2020-0025	FAC Filing
Union Electric Company d/b/a Ameren Missouri	ER-2020-0020	FAC True-Up Filing
Union Electric Company d/b/a Ameren Missouri	ER-2020-0019	FAC Filing
KCP&L GMO	ER-2019-0414	FAC True-Up Filing
KCP&L GMO	ER-2019-0413	FAC Filing
Union Electric Company d/b/a Ameren Missouri	EO-2019-0376	MEEIA Prudence Review
Empire District Electric Company	EO-2019-0302	FAC True-Up Filing
Empire District Electric Company	ER-2019-0301	FAC Filing
Union Electric Company d/b/a Ameren Missouri	EO-2019-0289	FAC True-Up Filing
Union Electric Company d/b/a Ameren Missouri	ER-2019-0287	FAC Filing
Union Electric Company d/b/a Ameren Missouri	EO-2019-0257	FAC Prudence Review
KCPL	ER-2019-0223	FAC Filing
KCPL	EO-2019-0222	FAC True-Up Filing
KCP&L GMO	ER-2019-0198	FAC Filing

con't Lisa M. Wildhaber

PARTICIPATION		TESTIMONY
COMPANY	CASE NO.	ISSUES
KCP&L GMO	ER-2019-0199	FAC True-Up Filing
Empire District Electric Company	ER-2019-0095	FAC Filing
Empire District Electric Company	ER-2019-0096	FAC True-Up Filing
KCPL	EO-2019-0068	FAC Prudence Review
KCP&L GMO	EO-2019-0067	FAC Prudence Review
KCPL	ER-2019-0031	FAC Filing
KCPL	ER-2019-0032	FAC True-Up Filing
Union Electric Company d/b/a Ameren Missouri	ER-2019-0024	FAC Filing
Union Electric Company d/b/a Ameren Missouri	ER-2019-0025	FAC True-Up Filing
KCP&L GMO	ER-2018-0400	FAC Filing
KCP&L GMO	ER-2018-0401	FAC True-Up Filing
KCPL	EO-2018-0363	MEEIA Prudence Review
KCP&L GMO	EO-2018-0364	MEEIA Prudence Review

Matthew R. Young

Educational and Employment Background and Credentials

I am employed as a Utility Regulatory Auditor for the Missouri Public Service Commission ("Commission"). I earned a Bachelor of Liberal Arts Degree from The University of Missouri – Kansas City in May 2009 and a Master of Science in Accounting, also from The University of Missouri – Kansas City, in December 2011. I have been employed by the Commission as a Regulatory Auditor since July 2013.

As a Utility Regulatory Auditor, I perform rate audits and prepare miscellaneous filings for consideration by the Commission. In addition, I review exhibits and testimony on assigned issues, develop accounting adjustments and issue positions which are supported by workpapers and written testimony. For cases that do not require prepared testimony, I prepare Staff Recommendation Memorandums.

Cases in which I have participated and the scope of my contributions are listed below:

Case/Tracking Number	Company Name	Scope of Issues	Evidentiary Hearing
GO-2019-0356 GO-2019-0357	Spire –East and Spire – West	Overhead Costs in Rate Base, Reconciliation.	
WA-2019-0366 SA-2019-0367	Missouri American Water Company	Sale of Assets, Rate Base.	
WA-2019-0364 SA-2019-0365	Missouri American Water Company	Sale of Assets, Rate Base.	
WO-2019-0184	Missouri American Water Company	ISRS Rate Base.	
SA-2019-0161	United Services Inc.	Application for Certificate, Rate Base.	
ER-2018-0145 ER-2018-0146	Kansas City Power & Light & KCP&L Greater Missouri Operations	Fuel Prices & Inventories, Purchased Power Expense, Pensions, OPEBs, SERP, Outside Services	

Matthew R. Young

Case/Tracking Number	Company Name	Scope of Issues	Evidentiary Hearing
WM-2018-0104	Missouri American Water Company	Rate Base.	
WM-2018-0023	Liberty Utilities	Sale of Assets, Rate Base.	
WR-2017-0343	Gascony Water Company	Rate Base.	Yes
GR-2017-0215 GR-2017-0216	Laclede Gas Company & Missouri Gas Energy	Pensions, OPEBs, SERP, Incentive Compensation, Equity Compensation, Severance Costs.	Yes
WR-2017-0139	Stockton Hills Water Company	Revenue, Expenses, Rate Base.	
ER-2016-0285	Kansas City Power & Light	Forfeited Discounts, Bad Debt Expense, Customer Growth, Cash Working Capital, Payroll and Payroll Related Costs, Incentive Compensation, Rate Case Expense, Renewable Energy Standards Cost Recovery, Property Taxes.	Yes
SR-2016-0202	Raccoon Creek Utility Operating Company	Rate Base.	
ER-2016-0156	KCP&L Greater Missouri Operations	Payroll, Payroll Benefits, Payroll Taxes, Incentive Compensation, Injuries and Damages, Insurance Expense, Property Tax Expense, Rate Case Expense.	
SR-2016-0112	Cannon Home Association	Revenues and Expenses, Rate Base.	
WR-2016-0109 SR-2016-0110	Roy-L Utilities	Revenues and Expenses, Rate Base.	
WO-2016-0098	Missouri American Water Company	ISRS Revenues.	

Matthew R. Young

Case/Tracking Number	Company Name	Scope of Issues	Evidentiary Hearing
WR-2015-0246	Raytown Water Company	Revenues and Expenses, Rate Base.	
SC-2015-0152	Central Rivers Wastewater Utility	Verification of amounts identified in Complaint.	
WR-2015-0104	Spokane Highlands Water Company	Revenues and Expenses, Rate Base.	
GR-2015-0026	Laclede Gas Company	Plant Additions and Retirements, Contributions in Aid of Construction.	
GR-2015-0025	Missouri Gas Energy	Plant Additions and Retirements, Contributions in Aid of Construction.	
WR-2015-0020	Gascony Water Company	Revenues and Expenses, Rate Base.	
SM-2015-0014	Raccoon Creek Utility Operating Company	Sale of Assets, Rate Base, Acquisition Premium.	
ER-2014-0370	Kansas City Power & Light	Injuries & Damages, Insurance, Payroll, Payroll Benefits, Payroll Taxes, Property Taxes, Rate Case Expense.	Yes
SR-2014-0247	Central Rivers Wastewater Utility	Revenues and Expenses, Rate Base, Affiliated Transactions.	
HR-2014-0066	Veolia Energy Kansas City	Payroll, Payroll Benefits, Payroll Taxes, Bonus Compensation, Property Taxes, Insurance Expense, Injuries & Damages Expense, Outside Services, Rate Case Expense.	
GO-2014-0179	Missouri Gas Energy	Plant Additions, Contributions in Aid of Construction.	

Matthew R. Young

Case/Tracking Number	Company Name	Scope of Issues	Evidentiary Hearing
WR-2015-0246	Raytown Water Company	Revenues and Expenses, Rate Base.	
SC-2015-0152	Central Rivers Wastewater Utility	Verification of amounts identified in Complaint.	
WR-2015-0104	Spokane Highlands Water Company	Revenues and Expenses, Rate Base.	
GR-2015-0026	Laclede Gas Company	Plant Additions and Retirements, Contributions in Aid of Construction.	
GR-2015-0025	Missouri Gas Energy	Plant Additions and Retirements, Contributions in Aid of Construction.	
WR-2015-0020	Gascony Water Company	Revenues and Expenses, Rate Base.	
SM-2015-0014	Raccoon Creek Utility Operating Company	Sale of Assets, Rate Base, Acquisition Premium.	
ER-2014-0370	Kansas City Power & Light	Injuries & Damages, Insurance, Payroll, Payroll Benefits, Payroll Taxes, Property Taxes, Rate Case Expense.	Yes
SR-2014-0247	Central Rivers Wastewater Utility	Revenues and Expenses, Rate Base, Affiliated Transactions.	
HR-2014-0066	Veolia Energy Kansas City	Payroll, Payroll Benefits, Payroll Taxes, Bonus Compensation, Property Taxes, Insurance Expense, Injuries & Damages Expense, Outside Services, Rate Case Expense.	
GO-2014-0179	Missouri Gas Energy	Plant Additions, Contributions in Aid of Construction.	

Matthew R. Young

Case/Tracking Number	Company Name	Scope of Issues	Evidentiary Hearing
GR-2014-0007	Missouri Gas Energy	Advertising & Promotional Items, Dues and Donations, Lobbying Expense, Miscellaneous Expenses, PSC Assessment, Plant in Service, Depreciation Expense, Depreciation Reserve, Prepayments, Materials & Supplies, Customer Advances, Customer Deposits, Interest on Customer Deposits.	
SA-2014-0005	Central Rivers Wastewater Utility	Application for Certificate, Revenue and Expenses, Plant in Service, Depreciation Reserve. Other Rate Base Items.	

MISSOURI PUBLIC SERVICE COMMISSION

STAFF REPORT

COST OF SERVICE

APPENDIX 2

**Support for Staff
Cost of
Capital Recommendations**

**UNION ELECTRIC COMPANY,
d/b/a Ameren Missouri**

CASE NO. ER-2019-0335

*Jefferson City, Missouri
December 2019*

*Staff Exhibit No. 102
Date 3/4/20 Reporter JMB
File No. ER-2019-0335*

AN ANALYSIS OF THE COST OF CAPITAL

FOR

UNION ELECTRIC COMPANY

CASE NO. ER-2019-0335

SCHEDULES

BY

Jeffrey Smith

Financial Analysis

MISSOURI PUBLIC SERVICE COMMISSION

December 2019

Union Electric Company
Case No. ER-2019-0335

List of Schedules

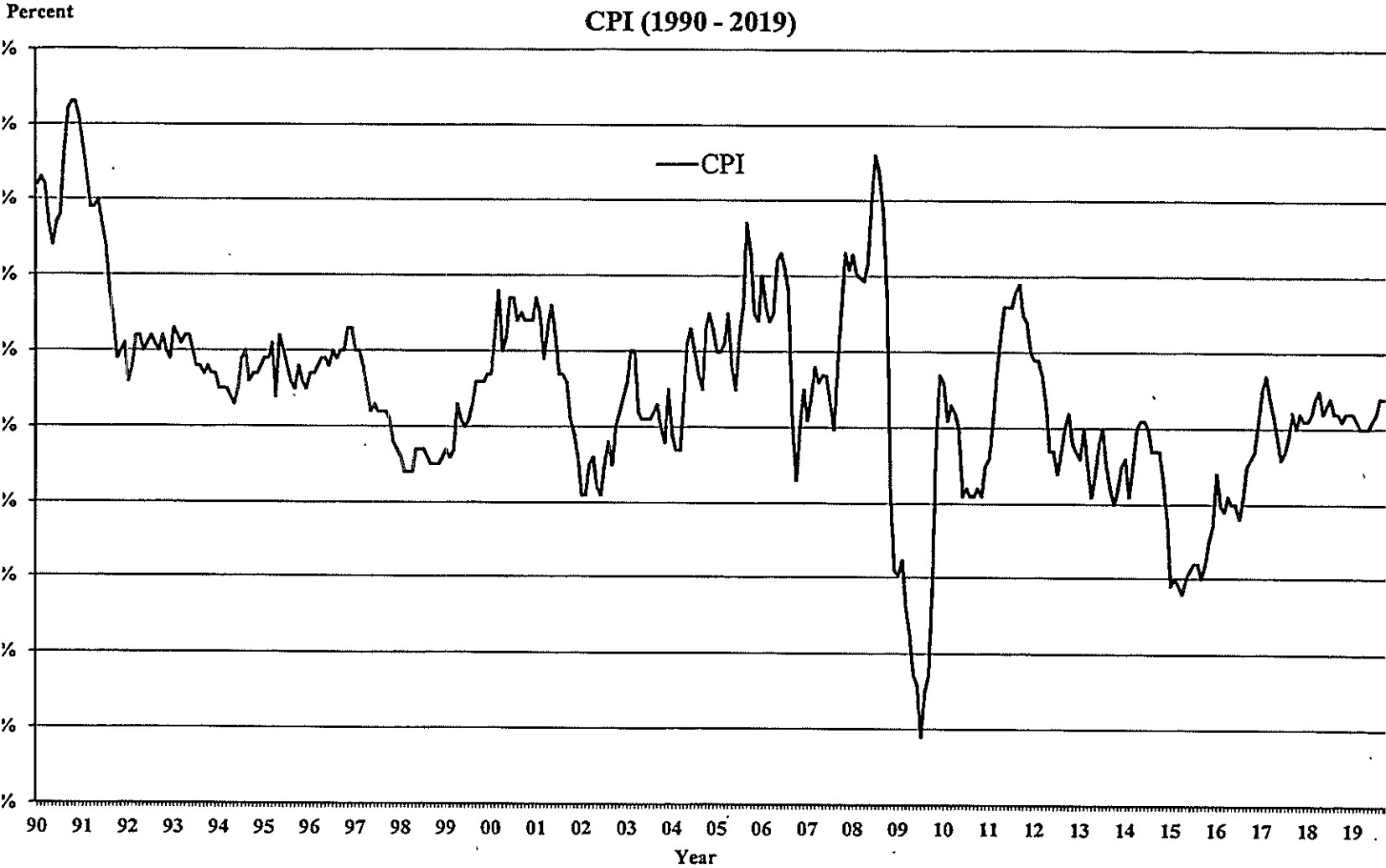
Schedule Number	Description of Schedule
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9-3	Constant-Growth Discount Cash Flow (DCF) Estimated Costs of Common Equity for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases
10-1	Capital Asset Pricing Model (CAPM) Costs of Common Equity Estimates Based on Historical Return Differences Between Common Stocks and Long-Term U.S. Treasuries for the Comparable Electric Utility Companies
10-2	Current Capital Asset Pricing Model (CAPM) Costs of Common Equity Estimates Based on Historical Return Differences Between Common Stocks and Long-Term U.S. Treasuries for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases
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**Union Electric Company
Case No. ER-2019-0335**

Consumer Price Index (CPI) Rate of Inflation									
Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1990	5.20	Jan 1996	2.70	Jan 2002	1.10	Jan 2008	4.30	Jan 2015	-0.10
Feb	5.30	Feb	2.70	Feb	1.10	Feb	4.00	Feb	0.00
Mar	5.20	Mar	2.80	Mar	1.50	Mar	4.00	Mar	-0.10
Apr	4.70	Apr	2.90	Apr	1.60	Apr	3.90	Apr	-0.20
May	4.40	May	2.90	May	1.20	May	4.20	May	0.00
Jun	4.70	Jun	2.80	Jun	1.10	Jun	5.00	Jun	0.10
Jul	4.80	Jul	3.00	Jul	1.50	Jul	5.60	Jul	0.20
Aug	5.60	Aug	2.90	Aug	1.80	Aug	5.40	Aug	0.20
Sep	6.20	Sep	3.00	Sep	1.50	Sep	4.90	Sep	0.00
Oct	6.30	Oct	3.00	Oct	2.00	Oct	3.70	Oct	0.20
Nov	6.30	Nov	3.30	Nov	2.20	Nov	1.10	Nov	0.50
Dec	6.10	Dec	3.30	Dec	2.40	Dec	0.10	Dec	0.70
Jan 1991	5.70	Jan 1997	3.00	Jan 2003	2.60	Jan 2009	0.00	Jan 2016	1.40
Feb	5.30	Feb	3.00	Feb	3.00	Feb	0.20	Feb	1.00
Mar	4.90	Mar	2.80	Mar	3.00	Mar	-0.40	Mar	0.90
Apr	4.90	Apr	2.50	Apr	2.20	Apr	-0.70	Apr	1.10
May	5.00	May	2.20	May	2.10	May	-1.28	May	1.00
Jun	4.70	Jun	2.30	Jun	2.10	Jun	-1.40	Jun	1.00
Jul	4.40	Jul	2.20	Jul	2.10	Jul	-2.10	Jul	0.80
Aug	3.80	Aug	2.20	Aug	2.20	Aug	-1.50	Aug	1.10
Sep	3.40	Sep	2.20	Sep	2.30	Sep	-1.30	Sep	1.50
Oct	2.90	Oct	2.10	Oct	2.00	Oct	-0.20	Oct	1.60
Nov	3.00	Nov	1.80	Nov	1.80	Nov	1.80	Nov	1.70
Dec	3.10	Dec	1.70	Dec	1.90	Dec	2.70	Dec	2.10
Jan 1992	2.60	Jan 1998	1.60	Jan 2004	1.90	Jan 2010	2.60	Jan 2017	2.50
Feb	2.80	Feb	1.40	Feb	1.70	Feb	2.10	Feb	2.70
Mar	3.20	Mar	1.40	Mar	1.70	Mar	2.30	Mar	2.40
Apr	3.20	Apr	1.40	Apr	2.30	April	2.20	Apr	2.20
May	3.00	May	1.70	May	3.10	May	2.00	May	1.90
Jun	3.10	Jun	1.70	Jun	3.30	Jun	1.10	Jun	1.60
Jul	3.20	Jul	1.70	Jul	3.00	Jul	1.20	Jul	1.70
Aug	3.10	Aug	1.60	Aug	2.70	Aug	1.10	Aug	1.90
Sep	3.00	Sep	1.50	Sep	2.50	Sep	1.10	Sep	2.20
Oct	3.20	Oct	1.50	Oct	3.30	Oct	1.20	Oct	2.00
Nov	3.00	Nov	1.50	Nov	3.50	Nov	1.10	Nov	2.20
Dec	2.90	Dec	1.60	Dec	3.30	Dec	1.50	Dec	2.10
Jan 1993	3.30	Jan 1999	1.70	Jan 2005	3.00	Jan 2011	1.60	Jan 2018	2.10
Feb	3.20	Feb	1.60	Feb	3.00	Feb	2.10	Feb	2.20
Mar	3.10	Mar	1.70	Mar	3.10	Mar	2.70	Mar	2.40
Apr	3.20	Apr	2.30	Apr	3.50	Apr	3.20	Apr	2.50
May	3.20	May	2.10	May	2.80	May	3.60	May	2.20
Jun	3.00	Jun	2.00	Jun	2.50	Jun	3.60	Jun	2.30
Jul	2.80	Jul	2.10	Jul	3.20	Jul	3.60	Jul	2.40
Aug	2.80	Aug	2.30	Aug	3.60	Aug	3.80	Aug	2.20
Sep	2.70	Sep	2.60	Sep	4.70	Sep	3.90	Sep	2.20
Oct	2.80	Oct	2.60	Oct	4.30	Oct	3.50	Oct	2.10
Nov	2.70	Nov	2.60	Nov	3.50	Nov	3.40	Nov	2.20
Dec	2.70	Dec	2.70	Dec	3.40	Dec	3.00	Dec	2.20
Jan 1994	2.50	Jan 2000	2.70	Jan 2006	4.00	Jan 2012	2.90	Jan 2019	2.20
Feb	2.50	Feb	3.20	Feb	3.60	Feb	2.90	Feb	2.10
Mar	2.50	Mar	3.70	Mar	3.40	Mar	2.70	Mar	2.20
Apr	2.40	Apr	3.00	Apr	3.50	Apr	2.30	Apr	2.00
May	2.30	May	3.20	May	4.20	May	1.70	May	2.00
Jun	2.50	Jun	3.70	Jun	4.30	Jun	1.70	Jun	2.10
Jul	2.90	Jul	3.70	Jul	4.10	Jul	1.40	Jul	2.20
Aug	3.00	Aug	3.40	Aug	3.80	Aug	1.70	Aug	2.40
Sep	2.60	Sep	3.50	Sep	2.10	Sep	2.00	Sep	2.40
Oct	2.70	Oct	3.40	Oct	1.30	Oct	2.20		
Nov	2.70	Nov	3.40	Nov	2.00	Nov	1.80		
Dec	2.80	Dec	3.40	Dec	2.50	Dec	1.70		
Jan 1995	2.90	Jan 2001	3.70	Jan 2007	2.10	Jan 2013	1.60		
Feb	2.90	Feb	3.50	Feb	2.40	Feb	2.00		
Mar	3.10	Mar	2.90	Mar	2.80	Mar	1.50		
Apr	2.40	Apr	3.30	Apr	2.60	Apr	1.10		
May	3.20	May	3.60	May	2.70	May	1.40		
Jun	3.00	Jun	3.20	Jun	2.70	Jun	1.80		
Jul	2.80	Jul	2.70	Jul	2.40	Jul	2.00		
Aug	2.60	Aug	2.70	Aug	2.00	Aug	1.50		
Sep	2.50	Sep	2.60	Sep	2.80	Sept	1.20		
Oct	2.80	Oct	2.10	Oct	3.50	Oct	1.00		
Nov	2.60	Nov	1.90	Nov	4.30	Nov	1.20		
Dec	2.50	Dec	1.60	Dec	4.10	Dec	1.50		

Source: U.S. Dept of Labor, Bureau of Labor Statistics, Consumer Price Index - All Urban Consumers, Change for 12-Month Period, Bureau of Labor Statistics, http://www.bls.gov/schedule/archives/cpi_ar.htm

Union Electric Company
Case No. ER-2019-0335



Union Electric Company
Case No. ER-2019-0335

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jan-90		8.09	8.12	8.21	8.26	0.03	0.12	0.17	0.09	0.14	0.05
Feb-90		8.37	8.42	8.47	8.50	0.05	0.10	0.13	0.05	0.08	0.03
Mar-90		8.63	8.60	8.59	8.56	<u>-0.03</u>	<u>-0.04</u>	<u>-0.06</u>	<u>-0.01</u>	<u>-0.04</u>	<u>-0.03</u>
Apr-90		8.72	8.77	8.79	8.76	0.04	0.06	0.03	0.02	<u>-0.01</u>	<u>-0.03</u>
May-90		8.64	8.74	8.76	8.73	0.09	0.12	0.09	0.02	0.00	<u>-0.03</u>
Jun-90		8.35	8.43	8.48	8.46	0.08	0.13	0.11	0.05	0.03	<u>-0.02</u>
Jul-90	8	8.16	8.33	8.47	8.50	0.17	0.31	0.34	0.14	0.17	0.03
Aug-90	8	8.06	8.44	8.75	8.86	0.38	0.69	0.80	0.32	0.43	0.11
Sep-90	8	8.08	8.51	8.89	9.03	0.43	0.81	0.95	0.38	0.52	0.14
Oct-90	7.75	7.88	8.33	8.72	8.86	0.45	0.84	0.98	0.39	0.53	0.14
Nov-90	7.5	7.60	8.02	8.39	8.54	0.42	0.79	0.94	0.37	0.52	0.15
Dec-90	7	7.31	7.73	8.08	8.24	0.41	0.76	0.92	0.35	0.51	0.16
Jan-91	6.75	7.13	7.70	8.09	8.27	0.57	0.97	1.14	0.39	0.57	0.18
Feb-91	6.25	6.87	7.47	7.85	8.03	0.61	0.99	1.17	0.38	0.56	0.18
Mar-91	6	7.10	7.77	8.11	8.29	0.67	1.01	1.19	0.34	0.52	0.18
Apr-91	6	6.95	7.70	8.04	8.21	0.75	1.09	1.26	0.34	0.51	0.17
May-91	5.75	6.78	7.70	8.07	8.27	0.92	1.28	1.48	0.37	0.57	0.20
Jun-91	5.75	6.96	7.94	8.28	8.47	0.98	1.33	1.52	0.35	0.53	0.19
Jul-91	5.75	6.92	7.91	8.27	8.45	0.99	1.36	1.53	0.36	0.54	0.18
Aug-91	5.5	6.43	7.43	7.90	8.14	0.99	1.47	1.71	0.48	0.72	0.24
Sep-91	5.25	6.18	7.14	7.65	7.95	0.95	1.47	1.77	0.51	0.81	0.30
Oct-91	5	5.91	6.87	7.53	7.93	0.96	1.62	2.02	0.66	1.06	0.40
Nov-91	4.75	5.56	6.62	7.42	7.92	1.06	1.86	2.36	0.80	1.30	0.50
Dec-91	4.5	5.03	6.19	7.09	7.70	1.16	2.06	2.68	0.90	1.52	0.61
Jan-92	4	4.96	6.24	7.03	7.58	1.28	2.07	2.62	0.79	1.34	0.55
Feb-92	4	5.21	6.58	7.34	7.85	1.37	2.13	2.64	0.76	1.28	0.52
Mar-92	4	5.69	6.95	7.54	7.97	1.26	1.86	2.28	0.60	1.02	0.43
Apr-92	3.75	5.34	6.78	7.48	7.96	1.44	2.14	2.62	0.70	1.18	0.48
May-92	3.75	5.23	6.69	7.39	7.89	1.47	2.17	2.67	0.70	1.20	0.50
Jun-92	3.75	5.05	6.48	7.26	7.84	1.43	2.21	2.79	0.78	1.36	0.58
Jul-92	3.25	4.36	5.84	6.84	7.60	1.48	2.49	3.24	1.01	1.76	0.75
Aug-92	3.25	4.19	5.60	6.59	7.39	1.40	2.39	3.20	0.99	1.79	0.80
Sep-92	3	3.89	5.38	6.42	7.34	1.49	2.52	3.45	1.04	1.96	0.93
Oct-92	3	4.08	5.60	6.59	7.53	1.52	2.51	3.45	0.99	1.93	0.94
Nov-92	3	4.58	6.04	6.87	7.61	1.46	2.29	3.03	0.84	1.57	0.73
Dec-92	3	4.67	6.08	6.77	7.44	1.40	2.10	2.76	0.69	1.36	0.67
Jan-93	3	4.39	5.83	6.60	7.34	1.44	2.21	2.95	0.77	1.51	0.74
Feb-93	3	4.10	5.43	6.26	7.09	1.33	2.16	2.99	0.83	1.66	0.83
Mar-93	3	3.95	5.19	5.98	6.82	1.25	2.03	2.87	0.78	1.63	0.85
Apr-93	3	3.84	5.13	5.97	6.85	1.30	2.13	3.02	0.84	1.72	0.88
May-93	3	3.98	5.20	6.04	6.92	1.22	2.06	2.94	0.84	1.72	0.88
Jun-93	3	4.16	5.22	5.96	6.81	1.05	1.80	2.64	0.75	1.59	0.84
Jul-93	3	4.07	5.09	5.81	6.63	1.02	1.73	2.55	0.71	1.53	0.82
Aug-93	3	4.00	5.03	5.68	6.32	1.02	1.68	2.32	0.65	1.30	0.65
Sep-93	3	3.85	4.73	5.36	6.00	0.89	1.51	2.15	0.63	1.26	0.64
Oct-93	3	3.87	4.71	5.33	5.94	0.83	1.46	2.06	0.63	1.23	0.61
Nov-93	3	4.16	5.06	5.72	6.21	0.91	1.57	2.05	0.66	1.15	0.49
Dec-93	3	4.21	5.15	5.77	6.25	0.93	1.56	2.04	0.63	1.11	0.48
Jan-94	3	4.14	5.09	5.75	6.29	0.95	1.61	2.15	0.66	1.20	0.54

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Feb-94	3.25	4.47	5.40	5.97	6.49	0.92	1.50	2.02	0.58	1.10	0.52
Mar-94	3.5	5.00	5.94	6.48	6.91	0.95	1.49	1.91	0.54	0.97	0.42
Apr-94	3.75	5.55	6.52	6.97	7.27	0.97	1.42	1.72	0.45	0.74	0.30
May-94	4.25	5.97	6.78	7.18	7.41	0.81	1.22	1.44	0.40	0.63	0.23
Jun-94	4.25	5.93	6.70	7.10	7.40	0.76	1.17	1.46	0.41	0.70	0.29
Jul-94	4.25	6.13	6.91	7.30	7.58	0.78	1.17	1.45	0.39	0.67	0.28
Aug-94	4.75	6.18	6.88	7.24	7.49	0.70	1.06	1.31	0.36	0.61	0.25
Sep-94	4.75	6.39	7.08	7.46	7.71	0.69	1.06	1.32	0.37	0.63	0.26
Oct-94	4.75	6.73	7.40	7.74	7.94	0.67	1.02	1.21	0.34	0.53	0.19
Nov-94	5.5	7.15	7.72	7.96	8.08	0.57	0.81	0.93	0.24	0.36	0.13
Dec-94	5.5	7.59	7.78	7.81	7.87	0.19	0.22	0.28	0.04	0.10	0.06
Jan-95	5.5	7.51	7.76	7.78	7.85	0.25	0.27	0.34	0.02	0.09	0.07
Feb-95	6	7.11	7.37	7.47	7.61	0.25	0.36	0.50	0.10	0.25	0.14
Mar-95	6	6.78	7.05	7.20	7.45	0.27	0.43	0.67	0.16	0.40	0.24
Apr-95	6	6.57	6.86	7.06	7.36	0.29	0.49	0.79	0.20	0.50	0.30
May-95	6	6.17	6.41	6.63	6.95	0.24	0.46	0.78	0.22	0.54	0.32
Jun-95	6	5.72	5.93	6.17	6.57	0.21	0.45	0.86	0.24	0.64	0.41
Jul-95	5.75	5.78	6.01	6.28	6.72	0.23	0.50	0.94	0.27	0.71	0.44
Aug-95	5.75	5.98	6.24	6.49	6.86	0.26	0.51	0.88	0.24	0.62	0.37
Sep-95	5.75	5.81	6.00	6.20	6.55	0.20	0.39	0.74	0.20	0.55	0.35
Oct-95	5.75	5.70	5.86	6.04	6.37	0.17	0.35	0.68	0.18	0.51	0.33
Nov-95	5.75	5.48	5.69	5.93	6.26	0.22	0.45	0.78	0.24	0.57	0.33
Dec-95	5.75	5.32	5.51	5.71	6.06	0.19	0.39	0.74	0.20	0.55	0.35
Jan-96	5.5	5.11	5.36	5.65	6.05	0.25	0.54	0.94	0.29	0.69	0.40
Feb-96	5.25	5.03	5.38	5.81	6.24	0.35	0.78	1.22	0.43	0.86	0.44
Mar-96	5.25	5.66	5.97	6.27	6.60	0.31	0.61	0.94	0.30	0.64	0.34
Apr-96	5.5	5.96	6.30	6.51	6.79	0.34	0.55	0.84	0.21	0.49	0.28
May-96	5.5	6.10	6.48	6.74	6.93	0.39	0.64	0.83	0.25	0.44	0.19
Jun-96	5.5	6.30	6.69	6.91	7.06	0.39	0.62	0.76	0.22	0.37	0.15
Jul-96	5.5	6.27	6.64	6.87	7.03	0.37	0.60	0.76	0.23	0.40	0.17
Aug-96	5.5	6.03	6.39	6.64	6.84	0.36	0.61	0.81	0.25	0.45	0.21
Sep-96	5.5	6.23	6.60	6.83	7.03	0.36	0.60	0.79	0.23	0.43	0.19
Oct-96	5.5	5.91	6.27	6.53	6.81	0.36	0.62	0.90	0.26	0.54	0.28
Nov-96	5.5	5.70	5.97	6.20	6.48	0.27	0.50	0.78	0.23	0.51	0.28
Dec-96	5.5	5.78	6.07	6.30	6.55	0.29	0.52	0.77	0.23	0.48	0.25
Jan-97	5.5	6.01	6.33	6.58	6.83	0.33	0.57	0.82	0.25	0.49	0.25
Feb-97	5.5	5.90	6.20	6.42	6.69	0.30	0.52	0.79	0.22	0.49	0.27
Mar-97	5.5	6.22	6.54	6.69	6.93	0.32	0.47	0.71	0.16	0.40	0.24
Apr-97	5.5	6.45	6.76	6.89	7.09	0.31	0.44	0.64	0.13	0.33	0.21
May-97	5.5	6.28	6.57	6.71	6.94	0.29	0.43	0.66	0.14	0.37	0.22
Jun-97	5.5	6.09	6.38	6.49	6.77	0.28	0.40	0.68	0.12	0.40	0.28
Jul-97	5.5	5.89	6.12	6.22	6.51	0.23	0.33	0.62	0.10	0.39	0.29
Aug-97	5.5	5.94	6.16	6.30	6.58	0.22	0.36	0.64	0.14	0.42	0.28
Sep-97	5.5	5.88	6.11	6.21	6.50	0.22	0.33	0.61	0.10	0.39	0.29
Oct-97	5.5	5.77	5.93	6.03	6.33	0.16	0.26	0.55	0.10	0.40	0.30
Nov-97	5.5	5.71	5.80	5.88	6.11	0.09	0.16	0.40	0.07	0.31	0.23
Dec-97	5.5	5.72	5.77	5.81	5.99	0.06	0.09	0.28	0.04	0.22	0.18
Jan-98	5.5	5.36	5.42	5.54	5.81	0.06	0.19	0.45	0.13	0.40	0.27
Feb-98	5.5	5.42	5.49	5.57	5.89	0.07	0.16	0.47	0.08	0.40	0.32

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Mar-98	5.5	5.56	5.61	5.65	5.95	0.05	0.09	0.39	0.04	0.34	0.30
Apr-98	5.5	5.56	5.61	5.64	5.92	0.05	0.07	0.36	0.03	0.31	0.29
May-98	5.5	5.59	5.63	5.65	5.93	0.03	0.06	0.33	0.02	0.30	0.27
Jun-98	5.5	5.52	5.52	5.50	5.70	0.00	<u>-0.02</u>	0.18	<u>-0.03</u>	0.18	0.21
Jul-98	5.5	5.46	5.46	5.46	5.68	0.00	0.00	0.22	0.00	0.22	0.22
Aug-98	5.5	5.27	5.27	5.34	5.54	0.01	0.07	0.27	0.07	0.27	0.20
Sep-98	5.25	4.67	4.62	4.81	5.20	<u>-0.04</u>	0.14	0.54	0.18	0.58	0.40
Oct-98	5	4.09	4.18	4.53	5.01	0.09	0.44	0.92	0.35	0.83	0.48
Nov-98	4.75	4.54	4.54	4.83	5.25	0.00	0.29	0.71	0.29	0.71	0.42
Dec-98	4.75	4.51	4.45	4.65	5.06	<u>-0.06</u>	0.14	0.55	0.19	0.61	0.41
Jan-99	4.75	4.62	4.60	4.72	5.16	<u>-0.01</u>	0.11	0.54	0.12	0.56	0.44
Feb-99	4.75	4.88	4.91	5.00	5.37	0.04	0.12	0.49	0.08	0.45	0.37
Mar-99	4.75	5.05	5.14	5.23	5.58	0.09	0.18	0.53	0.09	0.44	0.35
Apr-99	4.75	4.98	5.08	5.18	5.55	0.10	0.21	0.57	0.11	0.47	0.36
May-99	4.75	5.25	5.44	5.54	5.81	0.18	0.29	0.55	0.10	0.37	0.27
Jun-99	4.75	5.62	5.81	5.90	6.04	0.19	0.28	0.42	0.09	0.23	0.14
Jul-99	5	5.55	5.68	5.79	5.98	0.12	0.24	0.43	0.11	0.30	0.19
Aug-99	5	5.68	5.84	5.94	6.07	0.16	0.26	0.39	0.10	0.23	0.13
Sep-99	5.25	5.66	5.80	5.92	6.07	0.14	0.25	0.41	0.11	0.27	0.16
Oct-99	5.25	5.86	6.03	6.11	6.26	0.17	0.25	0.40	0.08	0.23	0.15
Nov-99	5.25	5.86	5.97	6.03	6.15	0.11	0.17	0.28	0.06	0.18	0.11
Dec-99	5.5	6.10	6.19	6.28	6.35	0.08	0.17	0.25	0.09	0.17	0.08
Jan-00	5.50	6.44	6.58	6.66	6.63	0.14	0.22	0.19	0.08	0.05	<u>-0.04</u>
Feb-00	5.75	6.61	6.68	6.52	6.23	0.07	<u>-0.09</u>	<u>-0.38</u>	<u>-0.16</u>	<u>-0.45</u>	<u>-0.29</u>
Mar-00	5.75	6.53	6.50	6.26	6.05	<u>-0.02</u>	<u>-0.27</u>	<u>-0.47</u>	<u>-0.25</u>	<u>-0.45</u>	<u>-0.20</u>
Apr-00	6	6.40	6.26	5.99	5.85	<u>-0.14</u>	<u>-0.41</u>	<u>-0.56</u>	<u>-0.27</u>	<u>-0.42</u>	<u>-0.14</u>
May-00	6	6.81	6.69	6.44	6.15	<u>-0.12</u>	<u>-0.37</u>	<u>-0.66</u>	<u>-0.25</u>	<u>-0.54</u>	<u>-0.29</u>
Jun-00	6.5	6.48	6.30	6.10	5.93	<u>-0.18</u>	<u>-0.38</u>	<u>-0.56</u>	<u>-0.20</u>	<u>-0.37</u>	<u>-0.17</u>
Jul-00	6.5	6.34	6.18	6.05	5.85	<u>-0.16</u>	<u>-0.29</u>	<u>-0.49</u>	<u>-0.13</u>	<u>-0.33</u>	<u>-0.20</u>
Aug-00	6.5	6.23	6.06	5.83	5.72	<u>-0.17</u>	<u>-0.40</u>	<u>-0.51</u>	<u>-0.23</u>	<u>-0.34</u>	<u>-0.11</u>
Sep-00	6.5	6.08	5.93	5.80	5.83	<u>-0.15</u>	<u>-0.28</u>	<u>-0.26</u>	<u>-0.14</u>	<u>-0.11</u>	0.03
Oct-00	6.5	5.91	5.78	5.74	5.80	<u>-0.13</u>	<u>-0.17</u>	<u>-0.11</u>	<u>-0.04</u>	0.02	0.06
Nov-00	6.5	5.88	5.70	5.72	5.78	<u>-0.18</u>	<u>-0.16</u>	<u>-0.10</u>	0.02	0.08	0.06
Dec-00	6.5	5.35	5.17	5.24	5.49	<u>-0.18</u>	<u>-0.11</u>	0.14	0.07	0.32	0.25
Jan-01	6	4.76	4.86	5.16	5.54	0.10	0.40	0.78	0.30	0.68	0.38
Feb-01	5.5	4.66	4.89	5.10	5.45	0.23	0.44	0.80	0.21	0.57	0.36
Mar-01	5.5	4.34	4.64	4.89	5.34	0.30	0.54	1.00	0.24	0.70	0.45
Apr-01	5	4.23	4.76	5.14	5.65	0.53	0.91	1.41	0.38	0.88	0.51
May-01	4.5	4.26	4.93	5.39	5.78	0.67	1.13	1.52	0.46	0.85	0.39
Jun-01	4	4.08	4.81	5.28	5.67	0.73	1.20	1.59	0.48	0.86	0.39
Jul-01	3.75	4.04	4.76	5.24	5.61	0.72	1.20	1.57	0.47	0.85	0.38
Aug-01	3.5	3.76	4.57	4.97	5.48	0.82	1.21	1.73	0.40	0.91	0.51
Sep-01	3	3.12	4.12	4.73	5.48	1.00	1.61	2.36	0.62	1.37	0.75
Oct-01	2.5	2.73	3.91	4.57	5.32	1.18	1.84	2.59	0.66	1.41	0.75
Nov-01	2	2.78	3.97	4.65	5.12	1.19	1.87	2.34	0.68	1.15	0.47
Dec-01	1.75	3.11	4.39	5.09	5.48	1.28	1.98	2.37	0.70	1.09	0.39
Jan-02	1.75	3.03	4.34	5.04	5.45	1.31	2.01	2.42	0.70	1.11	0.41
Feb-02	1.75	3.02	4.30	4.91	5.40	1.28	1.90	2.39	0.61	1.10	0.49
Mar-02	1.75	3.56	4.74	5.28	0	1.18	1.73		0.55		

Union Electric Company
Case No. ER-2019-0335

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Apr-02	1.75	3.42	4.65	5.21	0	1.22	1.79		0.56		
May-02	1.75	3.26	4.49	5.16	0	1.23	1.90		0.67		
Jun-02	1.75	2.99	4.19	4.93	0	1.19	1.93		0.74		
Jul-02	1.75	2.56	3.81	4.65	0	1.25	2.10		0.85		
Aug-02	1.75	2.13	3.29	4.26	0	1.16	2.12		0.96		
Sep-02	1.75	2.00	2.94	3.87	0	0.93	1.87		0.93		
Oct-02	1.75	1.91	2.95	3.94	0	1.03	2.03		1.00		
Nov-02	1.25	1.92	3.05	4.05	0	1.13	2.13		0.99		
Dec-02	1.25	1.84	3.03	4.03	0	1.20	2.20		1.00		
Jan-03	1.25	1.74	3.05	4.05	0	1.31	2.31		1.00		
Feb-03	1.25	1.63	2.90	3.90	0	1.27	2.27		1.00		
Mar-03	1.25	1.57	2.78	3.81	0	1.21	2.23		1.02		
Apr-03	1.25	1.62	2.93	3.96	0	1.31	2.34		1.03		
May-03	1.25	1.42	2.52	3.57	0	1.10	2.15		1.05		
Jun-03	1.25	1.23	2.27	3.33	0	1.04	2.11		1.07		
Jul-03	1	1.47	2.87	3.98	0	1.40	2.50		1.10		
Aug-03	1	1.86	3.37	4.45	0	1.51	2.58		1.08		
Sep-03	1	1.71	3.18	4.27	0	1.48	2.57		1.09		
Oct-03	1	1.75	3.19	4.29	0	1.44	2.54		1.10		
Nov-03	1	1.93	3.29	4.30	0	1.36	2.37		1.01		
Dec-03	1	1.91	3.27	4.27	0	1.36	2.36		1.00		
Jan-04	1	1.76	3.12	4.15	0	1.36	2.39		1.03		
Feb-04	1	1.74	3.07	4.08	0	1.33	2.34		1.02		
Mar-04	1	1.58	2.79	3.83	0	1.21	2.25		1.04		
Apr-04	1	2.07	3.39	4.35	0	1.32	2.28		0.96		
May-04	1	2.53	3.85	4.72	0	1.32	2.18		0.87		
Jun-04	1	2.76	3.93	4.73	0	1.17	1.97		0.80		
Jul-04	1.25	2.64	3.69	4.50	0	1.05	1.86		0.81		
Aug-04	1.25	2.51	3.47	4.28	0	0.97	1.77		0.81		
Sep-04	1.5	2.53	3.36	4.13	0	0.83	1.60		0.77		
Oct-04	1.75	2.58	3.35	4.10	0	0.76	1.51		0.75		
Nov-04	2	2.85	3.53	4.19	0	0.67	1.34		0.67		
Dec-04	2.25	3.01	3.60	4.23	0	0.59	1.22		0.63		
Jan-05	2.25	3.22	3.71	4.22	0	0.48	1.00		0.51		
Feb-05	2.5	3.38	3.77	4.17	0	0.38	0.78		0.40		
Mar-05	2.5	3.73	4.17	4.50	0	0.44	0.77		0.33		
Apr-05	2.75	3.65	4.00	4.34	0	0.34	0.69		0.34		
May-05	3	3.64	3.85	4.14	0	0.21	0.50		0.29		
Jun-05	3	3.64	3.77	4.00	0	0.13	0.36		0.23		
Jul-05	3.25	3.87	3.98	4.18	0	0.11	0.31		0.20		
Aug-05	3.5	4.04	4.12	4.26	0	0.08	0.22		0.14		
Sep-05	3.5	3.95	4.01	4.20	0	0.06	0.25		0.19		
Oct-05	3.75	4.27	4.33	4.46	0	0.06	0.19		0.14		
Nov-05	4	4.42	4.45	4.54	0	0.04	0.12		0.08		
Dec-05	4.25	4.40	4.39	4.47	0	<u>-0.01</u>	0.06		0.07		
Jan-06	4.25	4.40	4.35	4.42	0	<u>-0.05</u>	0.02		0.07		
Feb-06	4.5	4.67	4.57	4.57	4.54	<u>-0.10</u>	<u>-0.10</u>	<u>-0.13</u>	0.00	<u>-0.04</u>	<u>-0.03</u>
Mar-06	4.5	4.73	4.72	4.72	4.73	<u>-0.02</u>	<u>-0.01</u>	0.00	0.01	0.02	0.01
Apr-06	4.75	4.89	4.90	4.99	5.06	0.01	0.10	0.17	0.09	0.16	0.07

Union Electric Company
Case No. ER-2019-0335

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
May-06	5	4.97	5.00	5.11	5.20	0.03	0.14	0.23	0.11	0.20	0.09
Jun-06	5	5.12	5.07	5.11	5.15	<u>-0.05</u>	<u>-0.02</u>	0.03	0.04	0.09	0.05
Jul-06	5.25	5.12	5.04	5.09	5.13	<u>-0.08</u>	<u>-0.03</u>	0.02	0.05	0.09	0.05
Aug-06	5.25	4.90	4.82	4.88	5.00	<u>-0.08</u>	<u>-0.03</u>	0.09	0.05	0.17	0.12
Sep-06	5.25	4.77	4.67	4.72	4.85	<u>-0.10</u>	<u>-0.05</u>	0.08	0.05	0.18	0.13
Oct-06	4.75	4.80	4.69	4.73	4.85	<u>-0.11</u>	<u>-0.07</u>	0.06	0.04	0.17	0.13
Nov-06	4.5	4.74	4.58	4.60	4.69	<u>-0.16</u>	<u>-0.15</u>	<u>-0.05</u>	0.01	0.10	0.09
Dec-06	4.25	4.67	4.53	4.56	4.68	<u>-0.14</u>	<u>-0.11</u>	0.01	0.03	0.15	0.12
Jan-07	4.25	4.88	4.75	4.76	4.85	<u>-0.12</u>	<u>-0.12</u>	<u>-0.02</u>	0.01	0.10	0.09
Feb-07	3	4.85	4.71	4.72	4.82	<u>-0.14</u>	<u>-0.13</u>	<u>-0.03</u>	0.01	0.11	0.10
Mar-07	3	4.57	4.48	4.56	4.72	<u>-0.09</u>	<u>-0.01</u>	0.15	0.08	0.24	0.16
Apr-07	2.25	4.67	4.59	4.69	4.87	<u>-0.07</u>	0.03	0.20	0.10	0.27	0.17
May-07	2	4.77	4.67	4.75	4.90	<u>-0.10</u>	<u>-0.02</u>	0.14	0.08	0.23	0.16
Jun-07	2	4.98	5.03	5.10	5.20	0.05	0.12	0.22	0.08	0.18	0.10
Jul-07	2	4.82	4.88	5.00	5.11	0.07	0.19	0.29	0.12	0.22	0.10
Aug-07	2	4.31	4.43	4.67	4.93	0.12	0.36	0.62	0.24	0.50	0.26
Sep-07	2	4.01	4.20	4.52	4.79	0.19	0.51	0.78	0.32	0.59	0.27
Oct-07	1.5	3.97	4.20	4.53	4.77	0.23	0.56	0.81	0.33	0.58	0.25
Nov-07	1	3.34	3.67	4.15	4.52	0.33	0.81	1.18	0.48	0.85	0.37
Dec-07	1	3.12	3.49	4.10	4.53	0.37	0.98	1.41	0.61	1.04	0.43
Jan-08	0.25	2.48	2.98	3.74	4.33	0.50	1.27	1.85	0.76	1.35	0.59
Feb-08	0.25	1.97	2.78	3.74	4.52	0.81	1.76	2.54	0.96	1.74	0.78
Mar-08	0.25	1.62	2.48	3.51	4.39	0.87	1.89	2.78	1.03	1.91	0.88
Apr-08	0.25	2.05	2.84	3.68	4.44	0.79	1.63	2.40	0.83	1.60	0.77
May-08	0.25	2.45	3.15	3.88	4.60	0.71	1.43	2.15	0.73	1.44	0.72
Jun-08	0.25	2.77	3.49	4.10	4.69	0.71	1.33	1.92	0.61	1.20	0.59
Jul-08	0.25	2.57	3.30	4.01	4.57	0.73	1.43	2.00	0.70	1.27	0.56
Aug-08	0.25	2.42	3.14	3.89	4.50	0.72	1.47	2.08	0.74	1.36	0.62
Sep-08	0.25	2.08	2.88	3.69	4.27	0.81	1.61	2.19	0.80	1.38	0.58
Oct-08	0.25	1.61	2.73	3.81	4.17	1.11	2.20	2.56	1.09	1.45	0.36
Nov-08	0.25	1.21	2.29	3.53	4.00	1.08	2.31	2.79	1.24	1.71	0.48
Dec-08	0.25	0.82	1.52	2.42	2.87	0.70	1.60	2.05	0.89	1.35	0.45
Jan-09	0.25	0.81	1.60	2.52	3.13	0.79	1.71	2.32	0.92	1.53	0.61
Feb-09	0.25	0.98	1.87	2.87	3.59	0.90	1.89	2.61	1.00	1.72	0.72
Mar-09	0.25	0.93	1.82	2.82	3.64	0.88	1.89	2.71	1.00	1.83	0.82
Apr-09	0.25	0.93	1.86	2.93	3.76	0.93	2.00	2.83	1.07	1.90	0.83
May-09	0.25	0.93	2.13	3.29	4.23	1.20	2.36	3.30	1.16	2.09	0.93
Jun-09	0.25	1.18	2.71	3.72	4.52	1.52	2.54	3.33	1.02	1.81	0.79
Jul-09	0.25	1.02	2.46	3.56	4.41	1.44	2.54	3.39	1.10	1.94	0.84
Aug-09	0.25	1.12	2.57	3.59	4.37	1.46	2.47	3.26	1.02	1.80	0.78
Sep-09	0.25	0.96	2.37	3.40	4.19	1.41	2.45	3.23	1.03	1.82	0.78
Oct-09	0.25	0.95	2.33	3.39	4.19	1.38	2.44	3.24	1.05	1.86	0.80
Nov-09	0.25	0.80	2.23	3.40	4.31	1.43	2.60	3.51	1.17	2.08	0.91
Dec-09	0.25	0.87	2.34	3.59	4.49	1.47	2.72	3.62	1.25	2.15	0.90
Jan-10	0.25	0.93	2.48	3.73	4.60	1.56	2.80	3.68	1.25	2.12	0.87
Feb-10	0.25	0.86	2.36	3.69	4.62	1.51	2.83	3.76	1.33	2.26	0.93
Mar-10	0.25	0.96	2.43	3.73	4.64	1.47	2.77	3.69	1.29	2.21	0.92
Apr-10	0.25	1.06	2.58	3.85	4.69	1.52	2.79	3.63	1.27	2.11	0.85
May-10	0.25	0.83	2.18	3.42	4.29	1.35	2.59	3.46	1.24	2.11	0.87

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jun-10	0.25	0.72	2.00	3.20	4.13	1.27	2.48	3.40	1.21	2.13	0.92
Jul-10	0.25	0.62	1.76	3.01	3.99	1.15	2.39	3.38	1.25	2.23	0.98
Aug-10	0.25	0.52	1.47	2.70	3.80	0.95	2.18	3.28	1.23	2.34	1.10
Sep-10	0.25	0.48	1.41	2.65	3.77	0.93	2.17	3.29	1.24	2.36	1.13
Oct-10	0.25	0.38	1.18	2.54	3.87	0.81	2.16	3.50	1.36	2.69	1.33
Nov-10	0.25	0.45	1.35	2.76	4.19	0.90	2.31	3.73	1.41	2.84	1.42
Dec-10	0.25	0.62	1.93	3.29	4.42	1.32	2.67	3.80	1.36	2.48	1.13
Jan-11	0.25	0.61	1.99	3.39	4.52	1.38	2.78	3.91	1.40	2.53	1.13
Feb-11	0.25	0.77	2.26	3.58	4.65	1.49	2.80	3.88	1.32	2.39	1.08
Mar-11	0.25	0.70	2.11	3.41	4.51	1.42	2.72	3.82	1.30	2.40	1.10
Apr-11	0.25	0.73	2.17	3.46	4.50	1.43	2.72	3.77	1.29	2.33	1.05
May-11	0.25	0.56	1.84	3.17	4.29	1.29	2.61	3.74	1.33	2.45	1.12
Jun-11	0.25	0.41	1.58	3.00	4.23	1.17	2.59	3.82	1.42	2.65	1.23
Jul-11	0.25	0.41	1.54	3.00	4.27	1.13	2.60	3.86	1.46	2.73	1.27
Aug-11	0.25	0.23	1.02	2.30	3.65	0.79	2.07	3.42	1.28	2.63	1.35
Sep-11	0.25	0.21	0.90	1.98	3.18	0.69	1.76	2.97	1.07	2.28	1.21
Oct-11	0.25	0.28	1.06	2.15	3.13	0.78	1.87	2.85	1.09	2.07	0.98
Nov-11	0.25	0.25	0.91	2.01	3.02	0.65	1.76	2.76	1.11	2.11	1.00
Dec-11	0.25	0.26	0.89	1.98	2.98	0.63	1.72	2.73	1.09	2.09	1.00
Jan-12	0.25	0.24	0.84	1.97	3.03	0.59	1.73	2.79	1.13	2.19	1.06
Feb-12	0.25	0.28	0.83	1.97	3.11	0.55	1.69	2.83	1.14	2.28	1.14
Mar-12	0.25	0.34	1.02	2.17	3.28	0.67	1.83	2.94	1.16	2.26	1.11
Apr-12	0.25	0.29	0.89	2.05	3.18	0.60	1.76	2.89	1.16	2.29	1.13
May-12	0.25	0.29	0.76	1.80	2.93	0.48	1.52	2.65	1.04	2.17	1.13
Jun-12	0.25	0.29	0.71	1.62	2.70	0.42	1.33	2.41	0.91	1.99	1.08
Jul-12	0.25	0.25	0.62	1.53	2.59	0.37	1.28	2.34	0.91	1.97	1.06
Aug-12	0.25	0.27	0.71	1.68	2.77	0.45	1.41	2.50	0.96	2.06	1.09
Sep-12	0.25	0.26	0.67	1.72	2.88	0.41	1.47	2.63	1.05	2.21	1.16
Oct-12	0.25	0.28	0.71	1.75	2.90	0.43	1.47	2.62	1.04	2.19	1.15
Nov-12	0.25	0.27	0.67	1.65	2.80	0.40	1.39	2.54	0.99	2.14	1.15
Dec-12	0.25	0.26	0.70	1.72	2.88	0.44	1.46	2.63	1.02	2.19	1.16
Jan-13	0.25	0.27	0.81	1.91	3.08	0.54	1.65	2.82	1.11	2.28	1.17
Feb-13	0.25	0.27	0.85	1.98	3.17	0.58	1.72	2.90	1.14	2.32	1.18
Mar-13	0.25	0.26	0.82	1.96	3.16	0.56	1.70	2.91	1.14	2.34	1.21
Apr-13	0.25	0.23	0.71	1.76	2.93	0.48	1.53	2.70	1.05	2.22	1.17
May-13	0.25	0.25	0.84	1.93	3.11	0.59	1.68	2.86	1.09	2.27	1.18
Jun-13	0.25	0.33	1.20	2.30	3.40	0.87	1.97	3.07	1.10	2.20	1.10
Jul-13	0.25	0.34	1.40	2.58	3.61	1.06	2.24	3.26	1.18	2.20	1.02
Aug-13	0.25	0.36	1.52	2.74	3.76	1.16	2.38	3.40	1.22	2.24	1.02
Sep-13	0.25	0.40	1.60	2.81	3.79	1.19	2.41	3.38	1.21	2.19	0.98
Oct-13	0.25	0.34	1.37	2.62	3.68	1.03	2.28	3.34	1.25	2.31	1.06
Nov-13	0.25	0.30	1.37	2.72	3.80	1.07	2.41	3.50	1.35	2.43	1.08
Dec-13	0.25	0.34	1.58	2.90	3.89	1.24	2.56	3.55	1.33	2.31	0.99
Jan-14	0.25	0.39	1.65	2.86	3.77	1.25	2.46	3.38	1.21	2.12	0.91
Feb-14	0.25	0.33	1.52	2.71	3.66	1.19	2.38	3.34	1.19	2.15	0.95
Mar-14	0.25	0.40	1.64	2.72	3.62	1.24	2.32	3.22	1.08	1.98	0.90
Apr-14	0.25	0.42	1.70	2.71	3.52	1.28	2.29	3.10	1.00	1.82	0.81
May-14	0.25	0.39	1.59	2.56	3.39	1.20	2.17	3.00	0.97	1.80	0.83
Jun-14	0.25	0.45	1.68	2.60	3.42	1.23	2.15	2.97	0.92	1.74	0.82

Union Electric Company
Case No. ER-2019-0335

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jul-14	0.25	0.51	1.70	2.54	3.33	1.19	2.04	2.83	0.84	1.63	0.79
Aug-14	0.25	0.47	1.63	2.42	3.20	1.16	1.95	2.73	0.79	1.57	0.78
Sep-14	0.25	0.57	1.77	2.53	3.26	1.21	1.97	2.69	0.76	1.49	0.73
Oct-14	0.25	0.45	1.55	2.30	3.04	1.10	1.86	2.59	0.76	1.49	0.74
Nov-14	0.25	0.53	1.62	2.33	3.04	1.09	1.80	2.51	0.71	1.42	0.71
Dec-14	0.25	0.64	1.64	2.21	2.83	1.00	1.57	2.20	0.57	1.19	0.63
Jan-15	0.25	0.55	1.37	1.88	2.46	0.82	1.33	1.90	0.51	1.08	0.57
Feb-15	0.25	0.62	1.47	1.98	2.57	0.85	1.36	1.95	0.50	1.09	0.59
Mar-15	0.25	0.64	1.52	2.04	2.63	0.88	1.40	1.99	0.52	1.11	0.58
Apr-15	0.25	0.54	1.35	1.94	2.59	0.81	1.40	2.05	0.58	1.23	0.65
May-15	0.25	0.61	1.54	2.20	2.96	0.93	1.59	2.35	0.66	1.42	0.76
Jun-15	0.25	0.69	1.68	2.36	3.11	1.00	1.68	2.42	0.68	1.43	0.75
Jul-15	0.25	0.67	1.63	2.32	3.07	0.96	1.66	2.40	0.69	1.43	0.74
Aug-15	0.25	0.70	1.54	2.17	2.86	0.84	1.47	2.16	0.63	1.31	0.69
Sep-15	0.25	0.71	1.49	2.17	2.95	0.78	1.46	2.24	0.68	1.46	0.78
Oct-15	0.25	0.64	1.39	2.07	2.89	0.74	1.43	2.24	0.68	1.50	0.82
Nov-15	0.25	0.88	1.67	2.26	3.03	0.79	1.38	2.15	0.59	1.36	0.77
Dec-15	0.25	0.98	1.70	2.24	2.97	0.72	1.26	1.99	0.54	1.27	0.73
Jan-16	0.5	0.90	1.52	2.09	2.86	0.62	1.19	1.96	0.57	1.34	0.77
Feb-16	0.5	0.73	1.22	1.78	2.62	0.49	1.05	1.89	0.56	1.40	0.84
Mar-16	0.5	0.88	1.38	1.89	2.68	0.50	1.01	1.81	0.51	1.31	0.80
Apr-16	0.5	0.77	1.26	1.81	2.62	0.49	1.04	1.86	0.55	1.37	0.82
May-16	0.5	0.82	1.30	1.81	2.63	0.48	0.99	1.81	0.51	1.33	0.82
Jun-16	0.5	0.73	1.17	1.64	2.45	0.44	0.91	1.72	0.48	1.29	0.81
Jul-16	0.5	0.67	1.07	1.50	2.23	0.40	0.83	1.55	0.43	1.16	0.72
Aug-16	0.5	0.74	1.13	1.56	2.26	0.40	0.82	1.52	0.42	1.13	0.71
Sep-16	0.5	0.77	1.18	1.63	2.35	0.41	0.86	1.58	0.45	1.17	0.72
Oct-16	0.5	0.84	1.27	1.76	2.50	0.43	0.92	1.66	0.49	1.23	0.74
Nov-16	0.5	0.98	1.60	2.14	2.86	0.62	1.16	1.88	0.55	1.27	0.72
Dec-16	0.5	1.20	1.96	2.49	3.11	0.76	1.30	1.92	0.53	1.15	0.62
Jan-17	0.75	1.21	1.92	2.43	3.02	0.71	1.23	1.81	0.52	1.10	0.59
Feb-17	0.75	1.20	1.90	2.42	3.03	0.70	1.22	1.83	0.52	1.13	0.61
Mar-17	0.75	1.31	2.01	2.48	3.08	0.70	1.17	1.77	0.47	1.07	0.60
Apr-17	1	1.24	1.82	2.30	2.94	0.58	1.06	1.70	0.47	1.12	0.64
May-17	1	1.30	1.84	2.30	2.96	0.54	1.00	1.66	0.47	1.12	0.66
Jun-17	1	1.34	1.77	2.19	2.80	0.43	0.84	1.45	0.41	1.02	0.61
Jul-17	1.25	1.37	1.87	2.32	2.88	0.50	0.95	1.51	0.45	1.01	0.57
Aug-17	1.25	1.34	1.78	2.21	2.80	0.44	0.87	1.46	0.43	1.02	0.59
Sep-17	1.25	1.38	1.80	2.20	2.78	0.41	0.82	1.39	0.40	0.98	0.57
Oct-17	1.25	1.55	1.98	2.36	2.88	0.43	0.81	1.33	0.38	0.90	0.52
Nov-17	1.25	1.70	2.05	2.35	2.80	0.35	0.66	1.11	0.30	0.75	0.45
Dec-17	1.25	1.84	2.18	2.40	2.77	0.34	0.56	0.92	0.22	0.59	0.37
Jan-18	1.5	2.03	2.38	2.58	2.88	0.35	0.55	0.85	0.20	0.50	0.29
Feb-18	1.5	2.18	2.60	2.86	3.13	0.42	0.68	0.96	0.26	0.53	0.27
Mar-18	1.5	2.28	2.63	2.84	3.09	0.35	0.57	0.82	0.21	0.46	0.25
Apr-18		2.38	2.70	2.87	3.07	0.32	0.49	0.69	0.17	0.37	0.20
May-18		2.51	2.82	2.98	3.13	0.31	0.47	0.62	0.16	0.31	0.15
Jun-18		2.53	2.78	2.91	3.05	0.25	0.38	0.52	0.13	0.27	0.14
Jul-18		2.61	2.78	2.89	3.01	0.17	0.28	0.40	0.11	0.23	0.12

Union Electric Company
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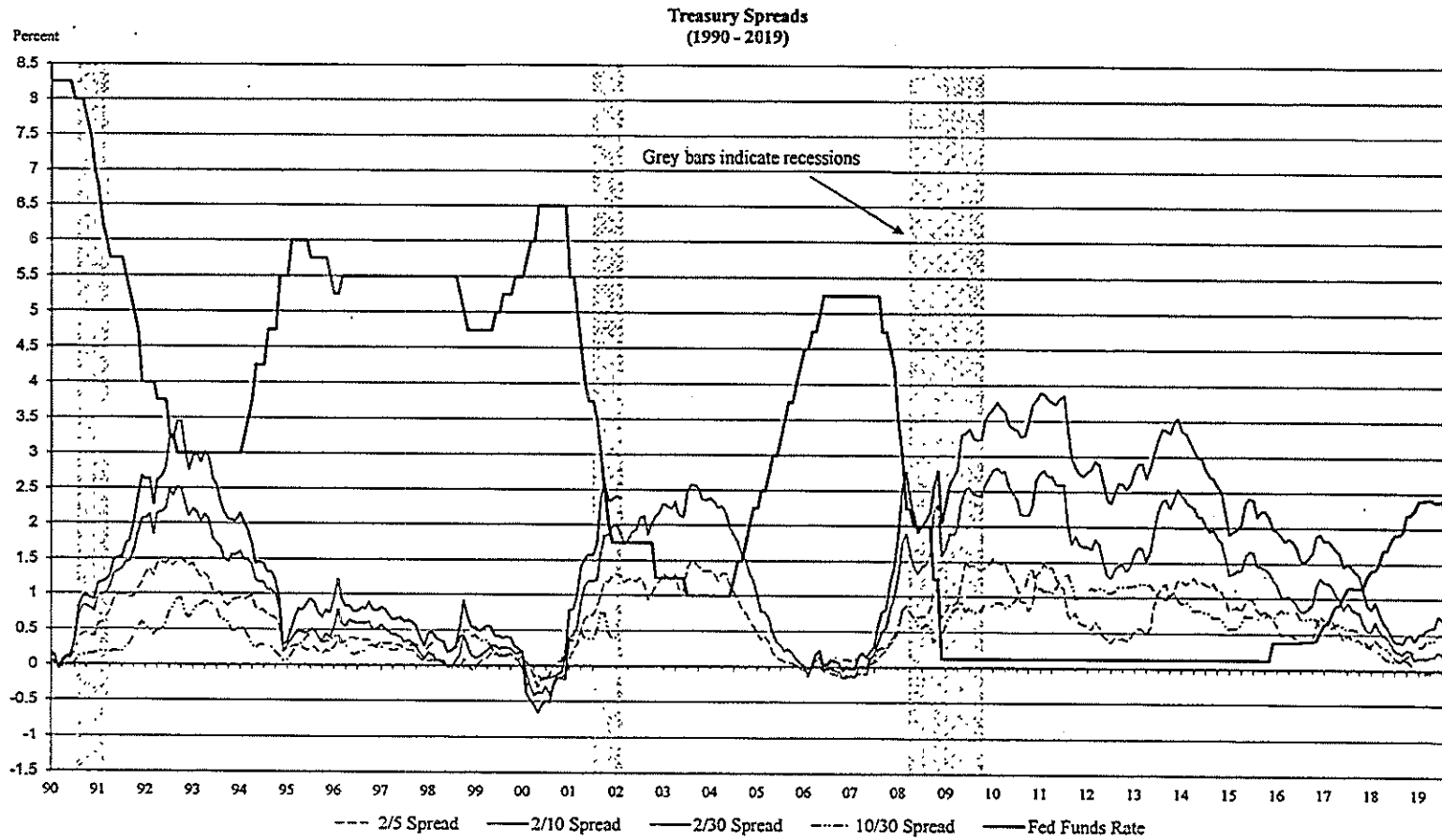
Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Aug-18		2.64	2.77	2.89	3.04	0.13	0.25	0.40	0.12	0.27	0.15
Sep-18		2.77	2.89	3.00	3.15	0.12	0.23	0.38	0.11	0.26	0.15
Oct-18		2.86	3.00	3.15	3.34	0.14	0.29	0.48	0.15	0.34	0.19
Nov-18		2.86	2.95	3.12	3.36	0.09	0.26	0.50	0.17	0.41	0.24
Dec-18		2.68	2.68	2.83	3.10	0.00	0.15	0.42	0.15	0.42	0.27
Jan-19		2.54	2.54	2.71	3.04	0.00	0.17	0.50	0.17	0.50	0.33
Feb-19		2.50	2.49	2.68	3.02	<u>-0.01</u>	0.18	0.52	0.19	0.53	0.34
Mar-19		2.41	2.37	2.57	2.98	<u>-0.04</u>	0.16	0.57	0.20	0.61	0.41
Apr-19		2.34	2.33	2.53	2.94	<u>-0.01</u>	0.19	0.60	0.20	0.61	0.41
May-19		2.21	2.19	2.40	2.82	<u>-0.02</u>	0.19	0.61	0.21	0.63	0.42
Jun-19		1.81	1.83	2.07	2.57	0.02	0.26	0.76	0.24	0.74	0.50
Jul-19		1.84	1.83	2.06	2.57	<u>-0.01</u>	0.22	0.73	0.23	0.74	0.51
Aug-19		1.57	1.49	1.63	2.12	<u>-0.08</u>	0.06	0.55	0.14	0.63	0.49
Sep-19		1.65	1.57	1.70	2.16	<u>-0.08</u>	0.05	0.51	0.13	0.59	0.46

Source: St. Louis Federal Reserve Bank Constant Maturity Yields Data



Union Electric Company
Case No. ER-2019-0335

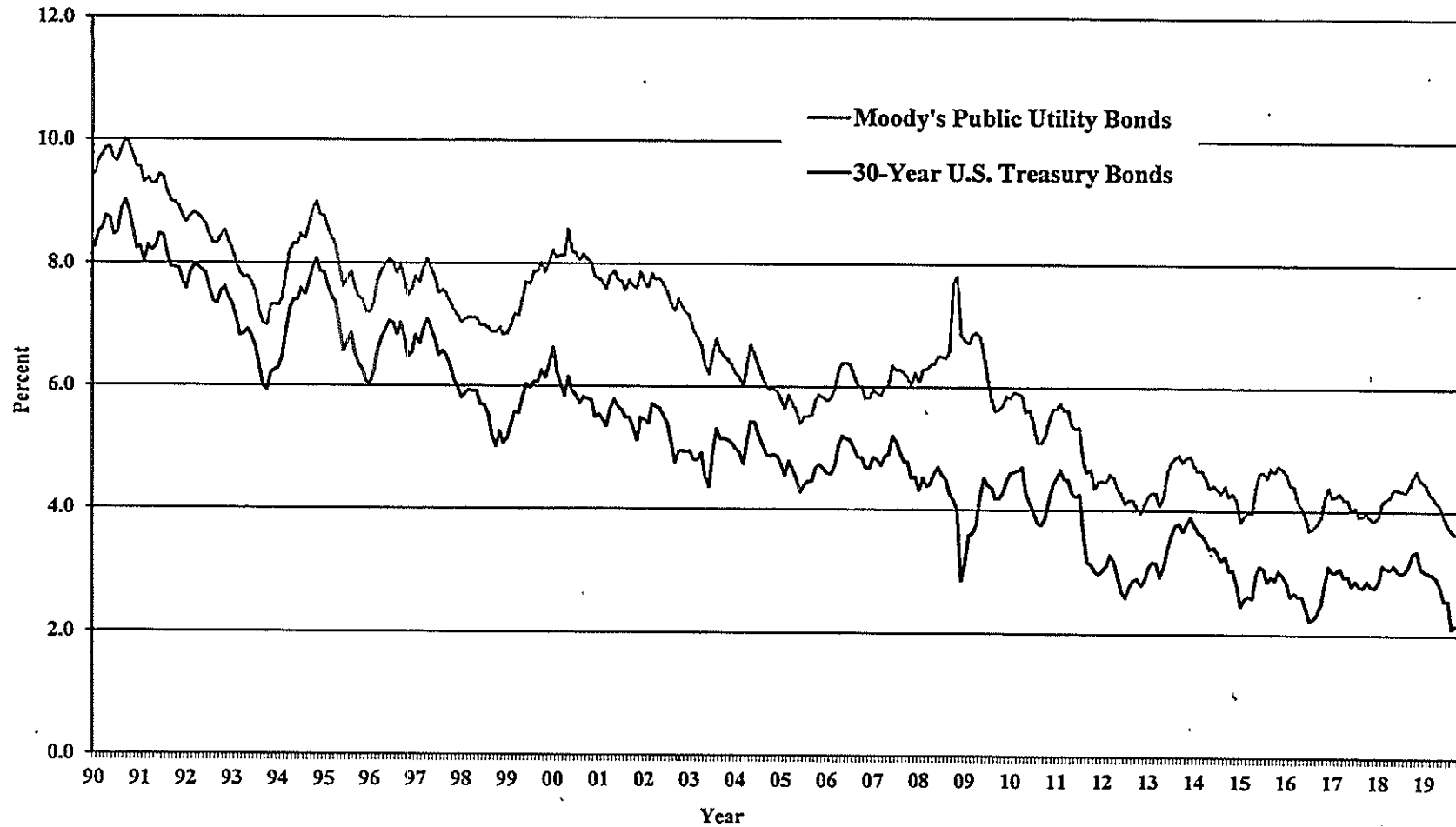
Average Yields on Public Utility Bonds

Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1990	9.44	Jan 1996	7.20	Jan 2002	7.69	Jan 2008	6.08	Jan 2014	4.72
Feb	9.66	Feb	7.37	Feb	7.62	Feb	6.28	Feb	4.64
Mar	9.75	Mar	7.72	Mar	7.83	Mar	6.29	Mar	4.63
Apr	9.87	Apr	7.88	Apr	7.74	Apr	6.36	Apr	4.52
May	9.89	May	7.99	May	7.76	May	6.38	May	4.37
Jun	9.69	Jun	8.07	Jun	7.67	Jun	6.50	Jun	4.42
Jul	9.66	Jul	8.02	Jul	7.54	Jul	6.50	Jul	4.35
Aug	9.84	Aug	7.84	Aug	7.34	Aug	6.48	Aug	4.29
Sep	10.01	Sep	8.01	Sep	7.23	Sep	6.59	Sep	4.40
Oct	9.94	Oct	7.76	Oct	7.43	Oct	7.70	Oct	4.24
Nov	9.76	Nov	7.48	Nov	7.31	Nov	7.80	Nov	4.29
Dec	9.57	Dec	7.58	Dec	7.20	Dec	6.87	Dec	4.18
Jan 1991	9.56	Jan 1997	7.79	Jan 2003	7.13	Jan 2009	6.77	Jan 2015	3.83
Feb	9.31	Feb	7.68	Feb	6.92	Feb	6.72	Feb	3.91
Mar	9.39	Mar	7.92	Mar	6.80	Mar	6.85	Mar	3.97
Apr	9.30	Apr	8.08	Apr	6.68	Apr	6.90	Apr	3.96
May	9.29	May	7.94	May	6.35	May	6.83	May	4.38
Jun	9.44	Jun	7.77	Jun	6.21	Jun	6.54	Jun	4.60
Jul	9.40	Jul	7.52	Jul	6.54	Jul	6.15	Jul	4.63
Aug	9.16	Aug	7.57	Aug	6.78	Aug	5.80	Aug	4.54
Sep	9.03	Sep	7.50	Sep	6.58	Sep	5.60	Sep	4.68
Oct	8.99	Oct	7.37	Oct	6.50	Oct	5.64	Oct	4.63
Nov	8.93	Nov	7.24	Nov	6.44	Nov	5.71	Nov	4.73
Dec	8.76	Dec	7.16	Dec	6.36	Dec	5.86	Dec	4.69
Jan 1992	8.67	Jan 1998	7.03	Jan 2004	6.23	Jan 2010	5.83	Jan 2016	4.62
Feb	8.77	Feb	7.09	Feb	6.17	Feb	5.94	Feb	4.44
Mar	8.84	Mar	7.13	Mar	6.01	Mar	5.90	Mar	4.40
Apr	8.79	Apr	7.12	Apr	6.38	Apr	5.87	Apr	4.16
May	8.72	May	7.11	May	6.68	May	5.59	May	4.06
Jun	8.64	Jun	6.99	Jun	6.53	Jun	5.62	Jun	3.93
Jul	8.46	Jul	6.99	Jul	6.34	Jul	5.41	Jul	3.70
Aug	8.34	Aug	6.96	Aug	6.18	Aug	5.10	Aug	3.73
Sep	8.32	Sep	6.88	Sep	6.01	Sep	5.10	Sep	3.80
Oct	8.44	Oct	6.88	Oct	5.95	Oct	5.20	Oct	3.90
Nov	8.53	Nov	6.96	Nov	5.97	Nov	5.45	Nov	4.21
Dec	8.36	Dec	6.84	Dec	5.93	Dec	5.61	Dec	4.39
Jan 1993	8.23	Jan 1999	6.87	Jan 2005	5.80	Jan 2011	5.69	Jan 2017	4.24
Feb	8.00	Feb	7.00	Feb	5.64	Feb	5.82	Feb	4.25
Mar	7.85	Mar	7.18	Mar	5.86	Mar	5.74	Mar	4.30
Apr	7.76	Apr	7.16	Apr	5.72	Apr	5.76	Apr	4.19
May	7.78	May	7.42	May	5.60	May	5.57	May	4.19
Jun	7.68	Jun	7.70	Jun	5.39	Jun	5.52	Jun	4.01
Jul	7.53	Jul	7.66	Jul	5.50	Jul	5.61	Jul	4.06
Aug	7.21	Aug	7.86	Aug	5.51	Aug	5.26	Aug	3.92
Sep	7.01	Sep	7.87	Sep	5.54	Sep	5.01	Sep	3.93
Oct	6.99	Oct	8.02	Oct	5.79	Oct	5.11	Oct	3.97
Nov	7.30	Nov	7.86	Nov	5.88	Nov	5.00	Nov	3.92
Dec	7.33	Dec	8.04	Dec	5.83	Dec	4.96	Dec	3.93
Jan 1994	7.31	Jan 2000	8.22	Jan 2006	5.77	Jan 2012	4.97	Jan 2018	3.97
Feb	7.44	Feb	8.10	Feb	5.83	Feb	4.99	Feb	3.88
Mar	7.83	Mar	8.14	Mar	5.98	Mar	5.13	Mar	3.85
Apr	8.20	Apr	8.14	Apr	6.28	Apr	5.05	April	4.24
May	8.32	May	8.55	May	6.39	May	4.84	May	4.36
Jun	8.31	Jun	8.22	Jun	6.39	Jun	4.67	Jun	4.37
Jul	8.47	Jul	8.17	Jul	6.37	Jul	4.56	Jul	4.35
Aug	8.41	Aug	8.05	Aug	6.20	Aug	4.71	August	4.33
Sep	8.65	Sep	8.16	Sep	6.03	Sep	4.75	Sep	4.41
Oct	8.88	Oct	8.03	Oct	6.01	Oct	4.69	Oct	4.56
Nov	9.00	Nov	8.03	Nov	5.82	Nov	4.53	Nov	4.65
Dec	8.79	Dec	7.79	Dec	5.83	Dec	4.28	Dec	4.51
Jan 1995	8.77	Jan 2001	7.76	Jan 2007	5.96	Jan 2013	4.45	Jan 2019	4.48
Feb	8.56	Feb	7.69	Feb	5.91	Feb	4.49	Feb	4.35
Mar	8.41	Mar	7.59	Mar	5.87	Mar	4.45	Mar	4.26
Apr	8.30	Apr	7.81	Apr	6.01	Apr	4.19	April	4.18
May	7.93	May	7.88	May	6.03	May	4.36	May	4.10
Jun	7.62	Jun	7.75	Jun	6.34	Jun	4.70	Jun	3.93
Jul	7.73	Jul	7.71	Jul	6.28	Jul	4.90	Jul	3.79
Aug	7.86	Aug	7.57	Aug	6.28	Aug	5.00	August	3.70
Sep	7.62	Sep	7.73	Sep	6.24	Sep	5.05	Sep	3.65
Oct	7.46	Oct	7.64	Oct	6.17	Oct	4.94		
Nov	7.40	Nov	7.61	Nov	6.04	Nov	5.04		
Dec	7.21	Dec	7.86	Dec	6.23	Dec	4.89		

Source:
Mergent Bond Record (through November 2010); BondsOnline (December 2010 - November 2013); Mergent Bond Record (December 2013 - Present).

Union Electric Company
Case No. ER-2019-0335

Average Yields on Public Utility Bonds and
30-Year U.S. Treasury Bonds (1990 - 2019)

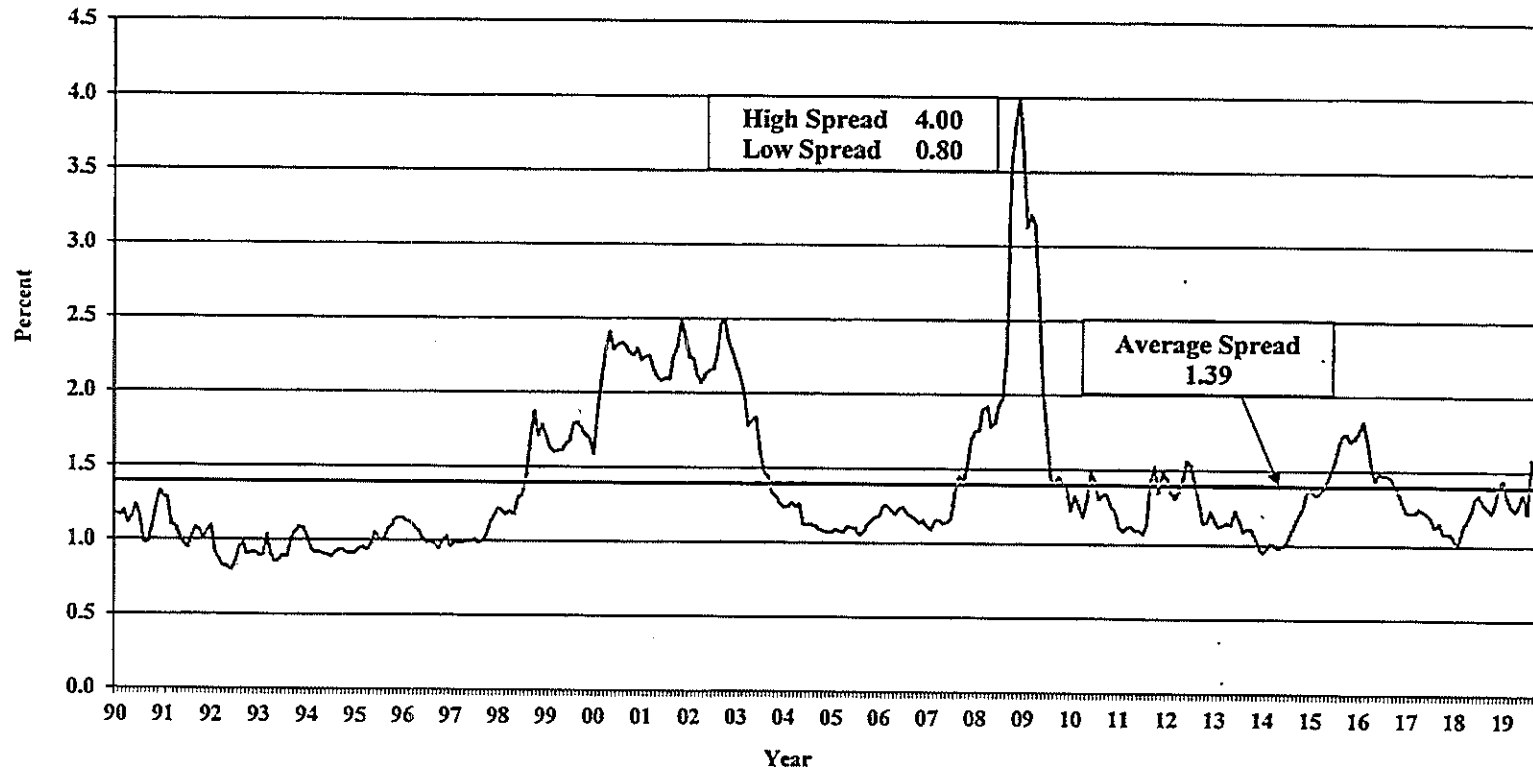


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Case No. ER-2019-03335
Union Electric Company

Union Electric Company
Case No. ER-2019-0335

Average Spreads Between Yields on Public Utility Bonds and
30-Year U.S. Treasury Bonds (1990 - 2019)



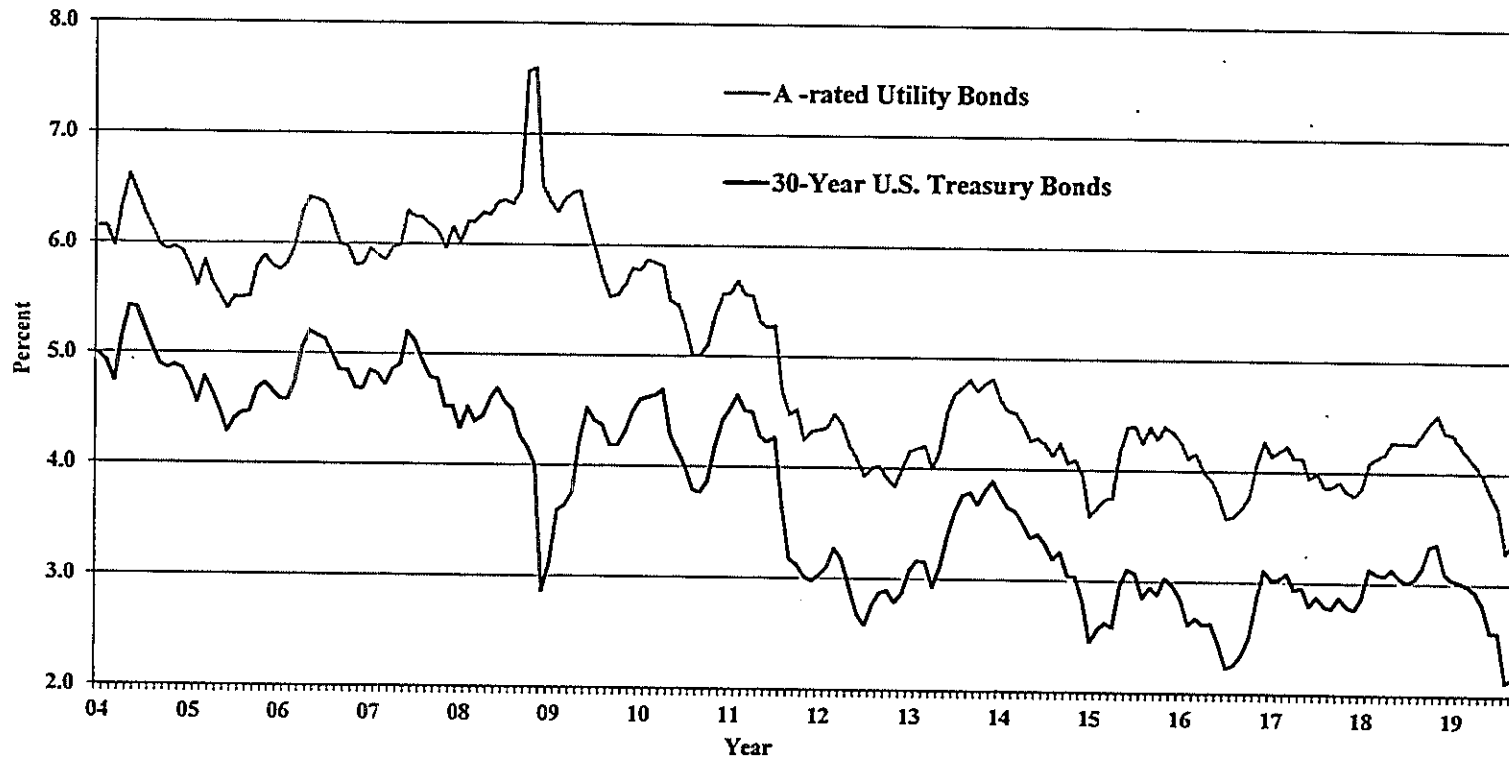
**Union Electric Company
Case No. ER-2019-0335**

Average Yields on A rated Public Utility Bonds

Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 2004	6.15	Jan 2008	6.02	Jan 2012	4.34	Jan 2016	4.27
Feb	6.15	Feb	6.21	Feb	4.36	Feb	4.11
Mar	5.97	Mar	6.21	Mar	4.48	Mar	4.16
Apr	6.35	Apr	6.29	Apr	4.40	Apr	4.00
May	6.62	May	6.27	May	4.20	May	3.93
Jun	6.46	Jun	6.38	Jun	4.08	Jun	3.78
Jul	6.27	Jul	6.40	Jul	3.93	Jul	3.57
Aug	6.14	Aug	6.37	Aug	4.00	Aug	3.59
Sep	5.98	Sep	6.49	Sep	4.02	Sep	3.66
Oct	5.94	Oct	7.56	Oct	3.91	Oct	3.77
Nov	5.97	Nov	7.60	Nov	3.84	Nov	4.08
Dec	5.92	Dec	6.54	Dec	4.00	Dec	4.27
Jan 2005	5.78	Jan 2009	6.39	Jan 2013	4.15	Jan 2017	4.14
Feb	5.61	Feb	6.30	Feb	4.18	Feb	4.18
Mar	5.83	Mar	6.42	Mar	4.20	Mar	4.23
Apr	5.64	Apr	6.48	Apr	4.00	Apr	4.12
May	5.53	May	6.49	May	4.17	May	4.12
Jun	5.40	Jun	6.20	Jun	4.53	Jun	3.94
Jul	5.51	Jul	5.97	Jul	4.68	Jul	3.99
Aug	5.50	Aug	5.71	Aug	4.73	Aug	3.86
Sep	5.52	Sep	5.53	Sep	4.80	Sep	3.87
Oct	5.79	Oct	5.55	Oct	4.70	Oct	3.91
Nov	5.88	Nov	5.64	Nov	4.77	Nov	3.83
Dec	5.80	Dec	5.79	Dec	4.81	Dec	3.79
Jan 2006	5.75	Jan 2010	5.77	Jan 2014	4.63	Jan 2018	3.86
Feb	5.82	Feb	5.87	Feb	4.53	Feb	4.09
Mar	5.98	Mar	5.84	Mar	4.51	Mar	4.13
Apr	6.29	Apr	5.81	Apr	4.41	Apr	4.17
May	6.42	May	5.50	May	4.26	May	4.28
Jun	6.40	Jun	5.46	Jun	4.29	Jun	4.27
Jul	6.37	Jul	5.26	Jul	4.23	Jul	4.27
Aug	6.20	Aug	5.01	Aug	4.13	Aug	4.26
Sep	6.00	Sep	5.01	Sep	4.24	Sep	4.36
Oct	5.98	Oct	5.10	Oct	4.06	Oct	4.45
Nov	5.80	Nov	5.37	Nov	4.09	Nov	4.52
Dec	5.81	Dec	5.56	Dec	3.95	Dec	4.37
Jan 2007	5.96	Jan 2011	5.57	Jan 2015	3.58	Jan 2019	4.35
Feb	5.90	Feb	5.68	Feb	3.67	Feb	4.25
Mar	5.85	Mar	5.56	Mar	3.74	Mar	4.16
Apr	5.97	Apr	5.55	Apr	3.75	April	4.08
May	5.99	May	5.32	May	4.17	May	3.98
Jun	6.30	Jun	5.26	Jun	4.39	Jun	3.82
Jul	6.25	Jul	5.27	Jul	4.40	July	3.69
Aug	6.24	Aug	4.69	Aug	4.25	Aug	3.29
Sep	6.18	Sep	4.48	Sep	4.39	Sep	3.37
Oct	6.11	Oct	4.52	Oct	4.29		
Nov	5.97	Nov	4.25	Nov	4.40		
Dec	6.16	Dec	4.33	Dec	4.35		

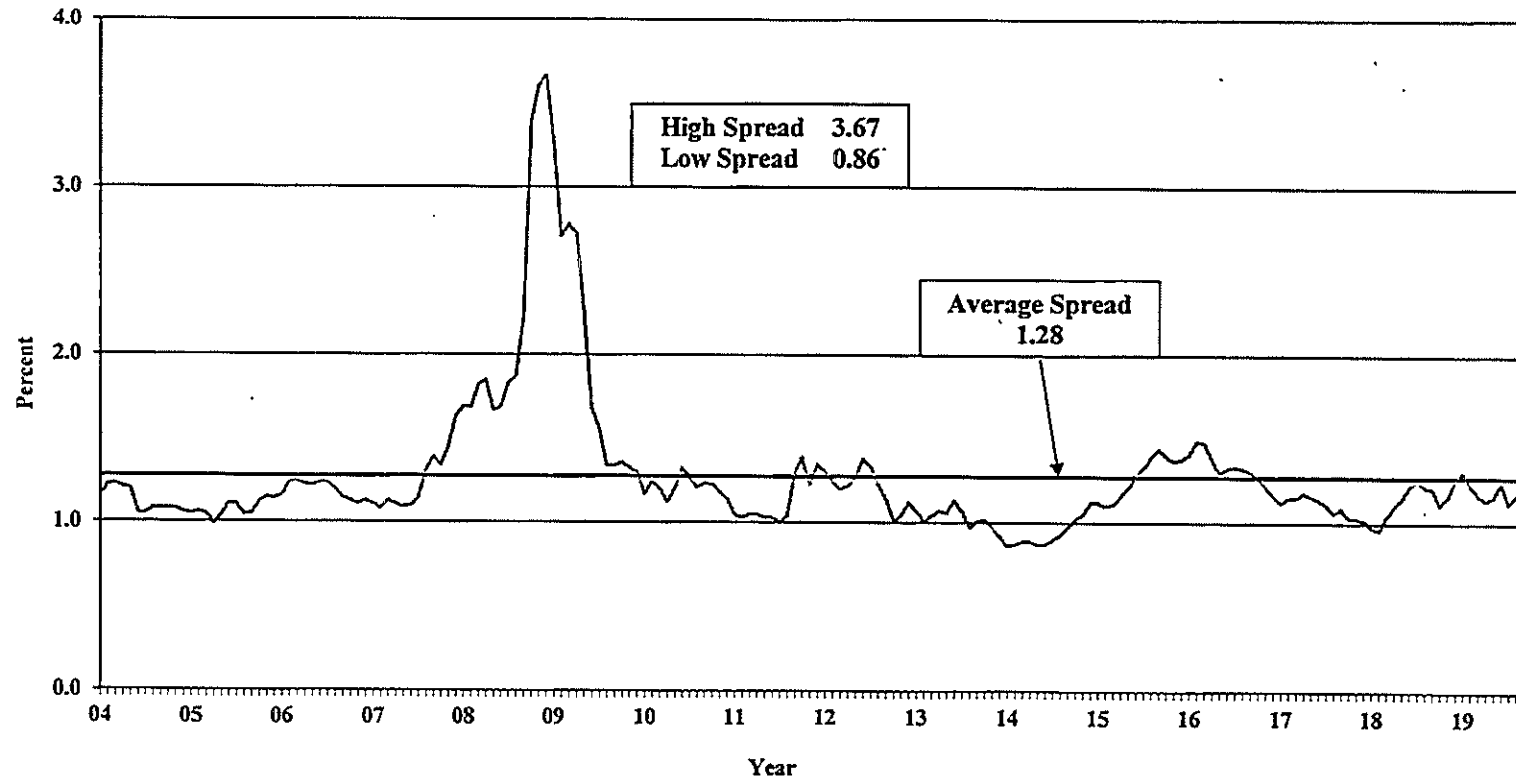
Source: Mergent Bond Record (through November 2010); BondsOnline (December 2010 - November 2013);
Mergent Bond Record (December 2013 - Present).

Average Yields on A-rated Utility Bonds and 30-Year U.S. Treasury Bonds
From (2004 - 2019)



Union Electric Company
Case No. ER-2019-0335

Average Spreads Between Yields on A-rated Public Utility Bonds
and 30-Year U.S. Treasury Bonds (2004 - 2019)



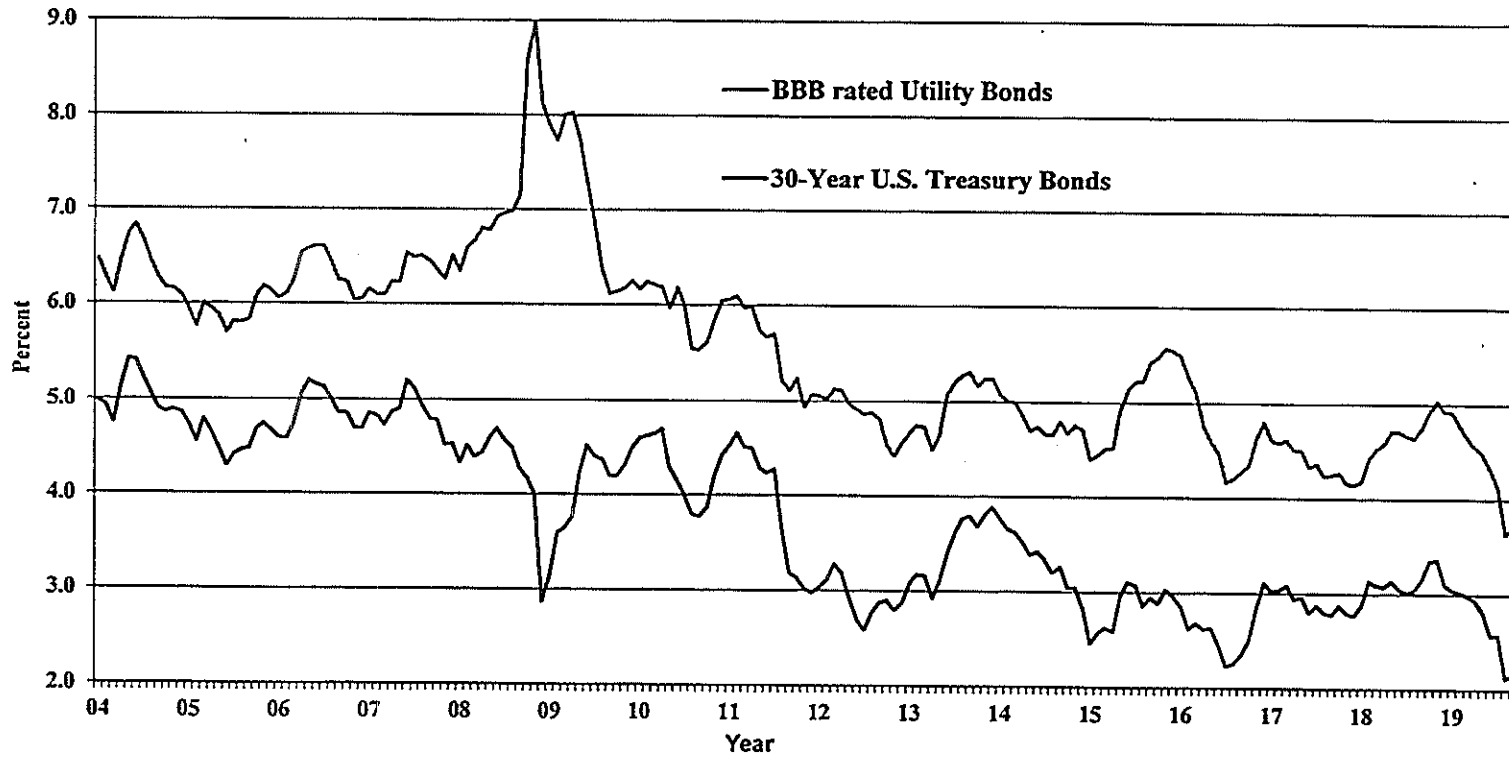
Union Electric Company
Case No. ER-2019-0335

Average Yields on BBB rated Public Utility Bonds

Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 2004	6.47	Jan 2008	6.35	Jan 2012	5.06	Jan 2016	5.49
Feb	6.28	Feb	6.60	Feb	5.02	Feb	5.28
Mar	6.12	Mar	6.68	Mar	5.13	Mar	5.12
Apr	6.46	Apr	6.81	Apr	5.11	Apr	4.75
May	6.75	May	6.79	May	4.97	May	4.60
Jun	6.84	Jun	6.93	Jun	4.91	Jun	4.47
Jul	6.67	Jul	6.97	Jul	4.85	Jul	4.16
Aug	6.45	Aug	6.98	Aug	4.88	Aug	4.20
Sep	6.27	Sep	7.15	Sep	4.81	Sep	4.27
Oct	6.17	Oct	8.58	Oct	4.54	Oct	4.34
Nov	6.16	Nov	8.98	Nov	4.42	Nov	4.64
Dec	6.10	Dec	8.13	Dec	4.56	Dec	4.79
Jan 2005	5.95	Jan 2009	7.90	Jan 2013	4.66	Jan 2017	4.62
Feb	5.76	Feb	7.74	Feb	4.74	Feb	4.58
Mar	6.01	Mar	8.00	Mar	4.72	Mar	4.62
Apr	5.95	Apr	8.03	Apr	4.49	Apr	4.51
May	5.88	May	7.76	May	4.65	May	4.50
Jun	5.70	Jun	7.30	Jun	5.08	Jun	4.32
Jul	5.81	Jul	6.87	Jul	5.21	Jul	4.36
Aug	5.80	Aug	6.36	Aug	5.28	Aug	4.23
Sep	5.83	Sep	6.12	Sep	5.31	Sep	4.24
Oct	6.08	Oct	6.14	Oct	5.17	Oct	4.26
Nov	6.19	Nov	6.18	Nov	5.24	Nov	4.16
Dec	6.14	Dec	6.26	Dec	5.25	Dec	4.14
Jan 2006	6.06	Jan 2010	6.16	Jan 2014	5.09	Jan 2018	4.18
Feb	6.11	Feb	6.25	Feb	5.01	Feb	4.42
Mar	6.26	Mar	6.22	Mar	5.00	Mar	4.52
Apr	6.54	Apr	6.19	Apr	4.85	Apr	4.58
May	6.59	May	5.97	May	4.69	May	4.71
Jun	6.61	Jun	6.18	Jun	4.73	Jun	4.71
Jul	6.61	Jul	5.98	Jul	4.66	Jul	4.67
Aug	6.43	Aug	5.55	Aug	4.65	Aug	4.64
Sep	6.26	Sep	5.53	Sep	4.79	Sep	4.74
Oct	6.24	Oct	5.62	Oct	4.67	Oct	4.91
Nov	6.04	Nov	5.85	Nov	4.75	Nov	5.03
Dec	6.05	Dec	6.04	Dec	4.70	Dec	4.92
Jan 2007	6.16	Jan 2011	6.06	Jan 2015	4.39	Jan 2019	4.91
Feb	6.10	Feb	6.10	Feb	4.44	Feb	4.76
Mar	6.10	Mar	5.97	Mar	4.51	Mar	4.65
Apr	6.24	Apr	5.98	Apr	4.51	April	4.55
May	6.23	May	5.74	May	4.91	May	4.47
Jun	6.54	Jun	5.67	Jun	5.13	Jun	4.31
Jul	6.49	Jul	5.70	Jul	5.22	Jul	4.13
Aug	6.51	Aug	5.22	Aug	5.23	Aug	3.63
Sep	6.45	Sep	5.11	Sep	5.42	Sep	3.71
Oct	6.36	Oct	5.24	Oct	5.47		
Nov	6.27	Nov	4.93	Nov	5.57		
Dec	6.51	Dec	5.07	Dec	5.55		

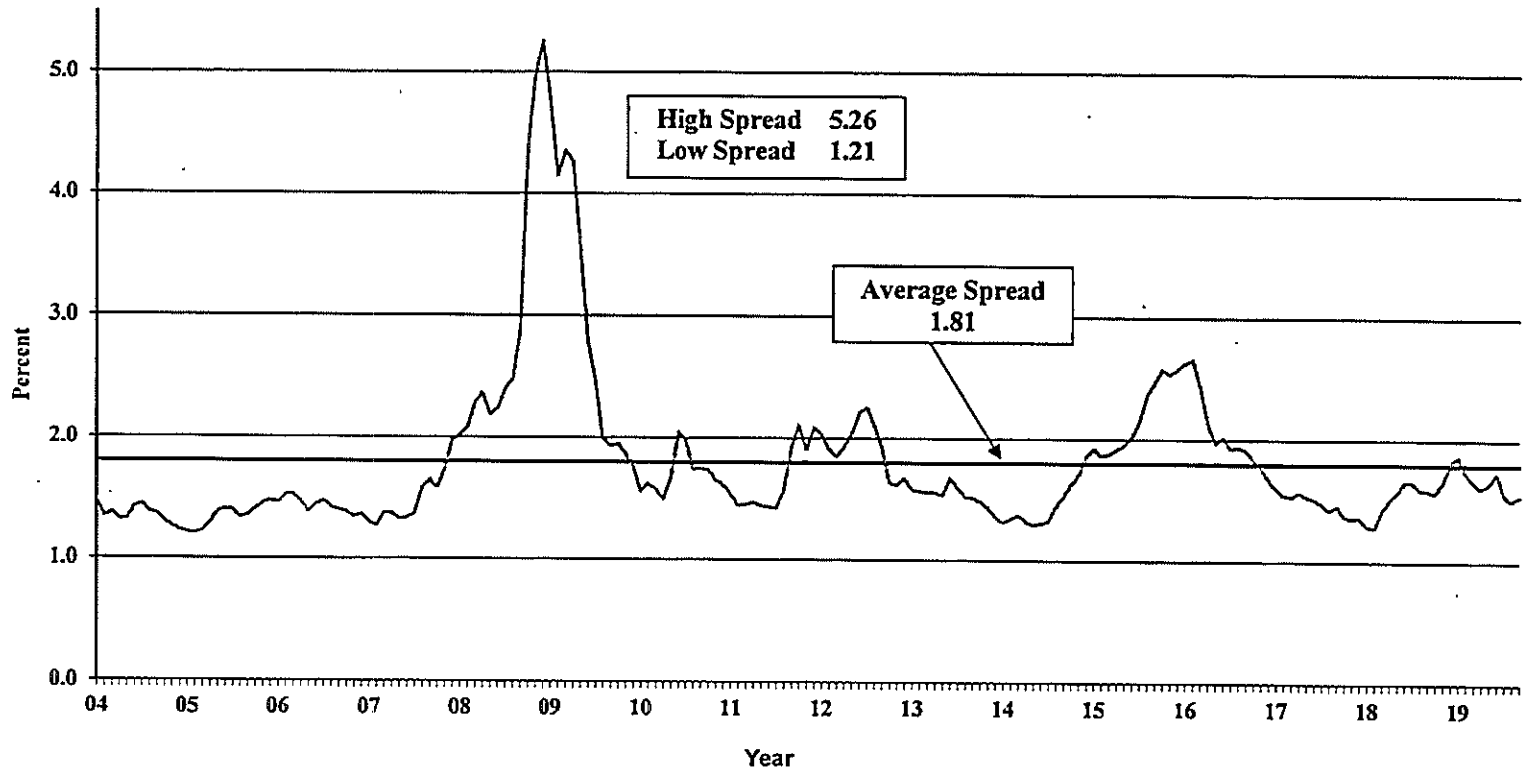
Source: Mergent Bond Record (through November 2010); BondsOnline (December 2010 - November 2013);
Mergent Bond Record (December 2013 - Present).

Average Yields on BBB rated Utility Bonds and 30-Year U.S. Treasury Bonds
From (2004 - 2019)



Union Electric Company
Case No. ER-2019-0335

Average Spreads Between Yields on BBB rated Public Utility Bonds
and 30-Year U.S. Treasury Bonds (2004 - 2019)



Union Electric Company
Case No. ER-2019-0335

Criteria for Selecting Comparable Electric Utility Companies

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(12)	
	Ticker	Stock Publicly Traded	80% of Assets U.S. Regulated (EET)	At Least Investment Grade Credit Rating (2 of 3 agencies)	L-T Growth Coverage from at least 2 equity analysts and L-T Growth Available	No Pending Merger or Acquisition	No Reduced Dividend Since 2016	At Least 80% of Income from U.S. Regulated Utility Operations	At least 50% of Plant from Electric Utility	At least 25% of Plant Electric Plant Generation	Comparable Company Met All Criteria
Edison Electric Institute											
Power Companies											
ALLETE, Inc.	ALE	YES	NO								
Alliant Energy Corporation	LNT	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Ameren Corporation ¹	AEE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
American Electric Power Company, Inc.	AEP	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
AVANGRID, Inc.	AGR	YES	NO								
Avista Corporation	AVA	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Black Hills Corporation	BKH	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CenterPoint Energy, Inc.	CNP	YES	NO						NO		
CMS Energy Corporation	CMS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Consolidated Edison, Inc.	ED	YES	YES	YES	YES	YES	YES	YES	YES	NO	
Dominion Resources, Inc.	D	YES	NO						YES	NO	
DTE Energy Company	DTE	YES	NO								
Duke Energy Corporation	DUK	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Edison International	EIX	YES	YES	YES	YES	YES	YES	YES	YES	NO	
El Paso Electric Company	EE	YES	YES	YES	YES	NO					
Entergy Corporation ²	ETR	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Energy, Inc.	EVRO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Eversource Energy	ES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Exelon Corporation	EXC	YES	NO						YES	NO	
FirstEnergy Corp.	FE	YES	YES	YES	YES	YES	YES	YES	YES	NO	
Hawaiian Electric Industries, Inc.	HE	YES	NO						YES	NO	
IDACORP, Inc.	IDA	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
MDU Resources Group, Inc.	MDU	YES	NO								
MGE Energy, Inc.	MGE	YES	NO								
NextEra Energy, Inc.	NEE	YES	NO								
NiSource Inc.	NI	YES	YES	YES	YES	YES	YES	YES	NO		
NorthWestern Corporation	NWE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
OG&E Energy Corp.	OGB	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Oter Tail Corporation	OTTR	YES	YES	YES	YES	NO					
PG&E Corporation	PCG	YES	YES	NO							
Pinnacle West Capital Corporation	PNW	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
PNM Resources, Inc.	PNM	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Portland General Electric Company	POR	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
PPL Corporation	PPL	YES	YES	YES	YES	YES	YES	NO			
Public Service Enterprise Group Inc	PEG	YES	NO								
SCANA Corporation	SCG	YES	YES	YES	NO						
Sempra Energy	SRE	YES	NO								
Southern Company	SO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Unitil Corporation	UTL	YES	YES	YES	YES	YES	YES	YES	NO		
Vacren Corporation	VVC	YES	YES	NO							
WEC Energy Group, Inc.	WEC	YES	YES	YES	YES	YES	NO				
Xcel Energy, Inc.	XEL	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Sources: Columns 1, 2, 3, 4 = Edison Electric Institute
Column 5, 6, 7, 8, 9, 10, 11 = SNL Finance

Notes: 1 Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excluded Ameren Data.

2 Entergy Corporation was not included because losses from its wholesale commodities business have led to considerable volatility in revenues, compared to the proxy group.

**Union Electric Company
Case No. ER-2019-0335**

**Comparable Electric Utility Companies
for Union Electric Company**

Number	Ticker Symbol	Company Name	S&P Corporate Credit Rating
1	LNT	Alliant Energy Corporation	A-
2	AEE	Ameren Corporation	BBB+
3	AEP	American Electric Power Company, Inc.	A-
4	AVA	Avista Corporation	BBB
5	CMS	CMS Energy Corporation	BBB+
6	DUK	Duke Energy Corporation	A-
8	EVRG	Eversource Energy, Inc.	A-
9	IDA	IDACORP, Inc.	BBB
10	NWE	NorthWestern Corporation	BBB
11	OGE	OGE Energy Corp.	BBB+
12	PNW	Pinnacle West Capital Corporation	A-
13	PNM	PNM Resources, Inc.	BBB+
14	POR	Portland General Electric Company	BBB+
15	SO	Southern Company	A-
16	XEL	Xcel Energy, Inc.	A-
Average			<u>BBB+</u>

Note: Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
Case No. ER-2019-0335

Spire Missouri Gas Proxy Group
Credit Ratings

Number	Ticker Symbol	Company Name	S&P Corporate Credit Rating
1	ATO	Atmos Energy Corporation	A
2	NWN	Northwest Natural Holding Company	A+
3	OGS	One Gas, Inc.	A
4	SWX	Southwest Gas Holdings, Inc.	BBB+
5	SR	Spire, Inc.	A-
		Average	<u>A</u>

Union Electric Company
Case No. ER-2019-0335

Historical Capital Structures Including Current Portions of Long-Term Debt - Goodwill:

Ameren
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 5,762	\$ 5,887	\$ 5,768	\$ 5,935	\$ 7,005	\$ 7,006	\$ 7,665	\$ 8,169
Preferred Stock	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142
Equity ²	\$ 7,508	\$ 6,205	\$ 6,133	\$ 6,302	\$ 6,535	\$ 6,692	\$ 6,773	\$ 7,220
Total	\$ 13,412	\$ 12,234	\$ 12,043	\$ 12,379	\$ 13,682	\$ 13,840	\$ 14,580	\$ 15,531

ATXI
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	0	\$ 37	\$ 51	\$ 100	\$ 290	\$ 350	\$ 525	\$ 525
Preferred Stock	NA	NA	NA	NA	NA	NA	NA	NA
Equity ²	\$ 28	\$ 32	\$ 63	\$ 124	\$ 343	\$ 477	\$ 658	\$ 660
Total	\$ 28	\$ 69	\$ 114	\$ 224	\$ 633	\$ 827	\$ 1,183	\$ 1,185

Ameren Illinois
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 1,658	\$ 1,727	\$ 1,856	\$ 2,224	\$ 2,471	\$ 2,588	\$ 2,830	\$ 3,296
Preferred Stock	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62
Equity ²	\$ 1,979	\$ 1,928	\$ 1,975	\$ 2,188	\$ 2,424	\$ 2,561	\$ 2,837	\$ 3,301
Total	\$ 3,699	\$ 3,717	\$ 3,893	\$ 4,474	\$ 4,957	\$ 5,211	\$ 5,729	\$ 6,659

Ameren Missouri
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 3,680	\$ 3,736	\$ 3,487	\$ 3,711	\$ 3,840	\$ 3,724	\$ 3,691	\$ 3,728
Preferred Stock	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80
Equity ²	\$ 3,957	\$ 3,974	\$ 3,913	\$ 3,972	\$ 4,002	\$ 4,010	\$ 4,001	\$ 4,149
Total	\$ 7,717	\$ 7,790	\$ 7,480	\$ 7,763	\$ 7,922	\$ 7,814	\$ 7,772	\$ 7,957

Notes: 1. Includes current maturities on long-term debt.
2. Minus goodwill.

Source: Market Intelligence

Union Electric Company
Case No. ER-2019-0335

Historical Capital Structures Including Current Portion of Long-Term Debt - Goodwill

Ameren <i>(in percentages)</i>									
<u>Capital Components</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>8 Year Average</u>
Long-Term Debt ¹	42.96%	48.12%	47.90%	47.94%	51.20%	50.62%	52.57%	52.60%	49.24%
Preferred Stock	1.06%	1.16%	1.18%	1.15%	1.04%	1.03%	0.97%	0.91%	1.06%
Equity ²	55.98%	50.72%	50.93%	50.91%	47.76%	48.35%	46.45%	46.49%	49.70%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

ATXI <i>(in percentages)</i>									
<u>Capital Components</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>8 Year Average</u>
Long-Term Debt ¹	0.00%	53.62%	44.74%	44.72%	45.78%	42.33%	44.38%	44.30%	44.30%
Preferred Stock	NA	NA	NA	NA	NA	NA	NA	NA	NA
Equity ²	100.00%	46.38%	55.26%	55.28%	54.22%	57.67%	55.62%	55.70%	55.70%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Ameren Illinois <i>(in percentages)</i>									
<u>Capital Components</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>8 Year Average</u>
Long-Term Debt ¹	44.82%	46.46%	47.68%	49.71%	49.85%	49.66%	49.40%	49.50%	49.62%
Preferred Stock	1.68%	1.67%	1.59%	1.39%	1.25%	1.19%	1.08%	0.93%	1.17%
Equity ²	53.50%	51.87%	50.73%	48.90%	48.90%	49.15%	49.52%	49.57%	49.21%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Ameren Missouri <i>(in percentages)</i>									
<u>Capital Components</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>8 Year Average</u>
Long-Term Debt ¹	47.69%	47.96%	46.62%	47.80%	48.47%	47.66%	47.49%	46.85%	47.66%
Preferred Stock	1.04%	1.03%	1.07%	1.03%	1.01%	1.02%	1.03%	1.01%	1.02%
Equity ²	51.28%	51.01%	52.31%	51.17%	50.52%	51.32%	51.48%	52.14%	51.32%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Notes: 1. Includes current maturities on long-term debt.
2. Minus goodwill.

Sources: Ameren's SEC 10-K for 2014, 2015, 2016, 2017, & 2018

Union Electric Company
Case No. ER-2019-0335

Staff Recommended Capital Structure for Ameren Missouri as of June 30, 2019

Capital Component	Percentage of Capital
Long-Term Debt	49.02%
Preferred Stock	0.98%
Common Equity ²	50.00%
Total Capitalization	100.00%

% Capital Structure for Ameren as of June 30, 2019 ¹

Capital Component	Percentage of Capital
Long-Term Debt	52.53%
Preferred Stock	0.90%
Common Equity	46.58%
Total Capitalization	100.00%

% Capital Structure for ATXI as of June 30, 2019 ¹

Capital Component	Percentage of Capital
Long-Term Debt	43.37%
Preferred Stock	NA
Common Equity	56.63%
Total Capitalization	100.00%

% Capital Structure for Ameren Illinois as of June 30, 2019 ¹

Capital Component	Percentage of Capital
Long-Term Debt	48.18%
Preferred Stock	0.91%
Common Equity	50.91%
Total Capitalization	100.00%

% Capital Structure for Ameren Missouri as of June 30, 2019 ¹

Capital Component	Percentage of Capital
Long-Term Debt	47.57%
Preferred Stock	0.98%
Common Equity ²	51.45%
Total Capitalization	100.00%

Source: 1. Market Intelligence

Notes: 2. Reduces common equity to Staff's recommended equity ratio, the reasonable level agreed to by Ameren and the Illinois Commerce Commission for Ameren's Illinois operations.

**Union Electric Company
Case No. ER-2019-0335**

Embedded Cost of Long-Term Debt as of June 30, 2019 for

Ameren

Total Annual Cost:	\$357,759,670
Total Carrying Value:	\$8,179,601,785
Embedded Cost = Total Annual Cost/Total Carrying Value	4.37%

ATXI

Total Annual Cost:	\$357,759,670
Total Carrying Value:	\$8,179,601,785
Embedded Cost = Total Annual Cost/Total Carrying Value	3.56%

Ameren Illinois

Total Annual Cost:	\$135,243,843
Total Carrying Value:	\$3,279,235,529
Embedded Cost = Total Annual Cost/Total Carrying Value	4.45%

Ameren Missouri

Total Annual Cost:	\$180,614,476
Total Carrying Value:	\$3,811,196,134
Embedded Cost = Total Annual Cost/Total Carrying Value	4.60%

Sources: Company response to Staff Data Request No. 0381

Union Electric Company
Case No. ER-2019-00335

Ten-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Comparable Electric Utility Companies

Company Name	10-Year Annual Compound Growth Rates			Average of Growth Rates
	DPS	EPS	BVPS	
Alliant Energy Corporation	7.05%	2.38%	4.13%	4.52%
Ameren Corporation ¹	-3.49%	-0.39%	-0.74%	-1.54%
American Electric Power Company, Inc.	4.30%	0.28%	3.98%	2.85%
Avista Corporation	8.75%	5.37%	4.09%	6.07%
CMS Energy Corporation	21.73%	NM	4.62%	13.17%
Duke Energy Corporation	1.47%	2.29%	0.97%	1.57%
Evergy, Inc.	NA	NA	NA	NA
IDACORP, Inc.	6.44%	7.11%	5.30%	6.28%
NorthWestern Corporation	5.08%	9.56%	5.67%	6.77%
OGE Energy Corp.	6.42%	6.12%	7.25%	6.60%
Pinnacle West Capital Corporation	2.70%	4.78%	2.63%	3.37%
PNM Resources, Inc.	2.17%	NM	0.03%	1.10%
Portland General Electric Company	4.57%	3.19%	2.73%	3.50%
Southern Company	3.72%	-1.75%	4.15%	2.04%
Xcel Energy, Inc.	4.67%	5.05%	4.38%	4.70%
Average	6.08%	4.03%	3.84%	4.81%

NA = Not Available

Source: Market Intelligence

Notes: ¹ Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
Case No. ER-2019-0335

Five-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Comparable Electric Utility Companies

Company Name	5-Year Annual Compound Growth Rates			
	DPS	EPS	BVPS	Average of Growth Rates
Alliant Energy Corporation	7.01%	4.99%	5.10%	5.70%
Ameren Corporation ¹	2.35%	6.31%	0.73%	3.13%
American Electric Power Company, Inc.	4.83%	0.34%	3.25%	2.81%
Avista Corporation	4.27%	4.75%	4.67%	4.56%
CMS Energy Corporation	7.24%	4.47%	5.25%	5.65%
Duke Energy Corporation	2.90%	2.42%	1.26%	2.19%
Evergy, Inc.	NA	NA	NA	NA
IDACORP, Inc.	10.17%	3.85%	5.12%	6.38%
NorthWestern Corporation	7.25%	6.84%	7.80%	7.29%
OGE Energy Corp.	9.67%	4.66%	5.95%	6.76%
Pinnacle West Capital Corporation	3.06%	4.73%	4.25%	4.01%
PNM Resources, Inc.	11.11%	-4.94%	0.83%	2.33%
Portland General Electric Company	4.54%	5.12%	3.63%	4.43%
Southern Company	3.44%	-4.80%	3.01%	0.55%
Xcel Energy, Inc.	6.10%	4.80%	4.42%	5.11%
Average	6.28%	2.86%	4.19%	4.44%

Source: Market Intelligence

Notes: 1 Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
Case No. ER-2019-0335

Historical and Projected Growth Rates
for the Comparable Electric Utility Companies

Company Name	(1) 10-Year Average DPS, EPS & BVPS	(2) 5-Year Average DPS, EPS & BVPS	(3) Mean Projected Long-Term Growth Rate
Alliant Energy Corporation	4.52%	5.70%	5.66%
Ameren Corporation ¹	-1.54%	3.13%	6.28%
American Electric Power Company, Inc.	2.85%	2.81%	5.82%
Avista Corporation	6.07%	4.56%	3.98%
CMS Energy Corporation	13.17%	5.65%	6.89%
Duke Energy Corporation	1.57%	2.19%	4.57%
Evergy, Inc.	NA	NA	6.17%
IDACORP, Inc.	6.28%	6.38%	3.50%
NorthWestern Corporation	6.77%	7.29%	3.41%
OGE Energy Corp.	6.60%	6.76%	5.18%
Pinnacle West Capital Corporation	3.37%	4.01%	5.29%
PNM Resources, Inc.	1.10%	2.33%	6.03%
Portland General Electric Company	3.50%	4.43%	4.84%
Southern Company	2.04%	0.55%	4.52%
Xcel Energy, Inc.	4.70%	5.11%	5.57%
Average	4.81%	4.44%	5.10%

Proposed Range of Growth for Comparables:

4.20% - 5.00%

Sources: Column 1 = Schedule 8-1 Market Intelligence

Column 2 = Schedule 8-2 Market Intelligence

Column 3 = Market Intelligence as of September, 2019

Notes: 1 Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
Case No. ER-2019-0335

Ten-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Spire Missouri Gas Proxy Group

Company Name	10-Year Annual Compound Growth Rates				Average of Growth Rates
	DPS	EPS	BVPS		
Atmos Energy Corporation	3.51%	7.92%	5.72%		5.71%
Northwest Natural Holding Company	2.64%	-0.99%	1.85%		1.17%
One Gas Inc.	NA	NA	NA		NA
Southwest Gas Holdings, Inc.	7.72%	7.23%	5.41%		6.79%
Spire Inc.	3.74%	4.55%	7.44%		5.24%
Average	4.40%	4.68%	5.10%		4.73%

NA = Not Available

Source: Market Intelligence

Union Electric Company
Case No. ER-2019-0335

**Five-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Spire Missouri Gas Proxy Group**

Company Name	5-Year Annual Compound Growth Rates			Average of Growth Rates
	DPS	EPS	BVPS	
Atmos Energy Corporation	5.54%	12.89%	7.25%	8.56%
Northwest Natural Holding Company	1.03%	0.55%	0.11%	0.57%
One Gas Inc.	NA	NA	NA	NA
Southwest Gas Holdings, Inc.	10.48%	5.21%	6.13%	7.27%
Spire Inc.	4.85%	7.49%	8.12%	6.82%
Average	5.47%	6.54%	5.40%	5.81%

Source: Market Intelligence

**Union Electric Company
Case No. ER-2019-0335**

**Historical and Projected Growth Rates
for the Spire Missouri Gas Proxy Group**

<u>Company Name</u>	(1) 10-Year Average DPS, EPS & BVPS	(2) 5-Year Average DPS, EPS & BVPS	(3) Mean Projected Long-Term Growth Rate
Atmos Energy Corporation	5.71%	8.56%	5.00%
Northwest Natural Holding Company	1.17%	0.57%	4.50%
One Gas Inc.	NA	NA	6.00%
Southwest Gas Holdings, Inc.	6.79%	7.27%	6.50%
Spire Inc.	5.24%	6.82%	6.00%
Average	4.73%	5.81%	5.60%

Proposed Range of Growth for Comparables:

4.20% - 5.00%

Sources: Column 1 = Schedule 8-1

Column 2 = Schedule 8-2

Column 3 = Market Intelligence as of September, 2019

**Union Electric Company
Case No. ER-2019-0335**

**Constant-Growth Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Electric Utility Companies**

Company Name	(1)	(2)	(3)
	Expected Annual Dividend	Average High/Low Stock Price	Projected Dividend Yield
Alliant Energy Corporation	\$1.49	\$51.22	2.90%
Ameren Corporation ¹	\$2.02	\$76.52	2.63%
American Electric Power Company, Inc.	\$2.82	\$90.77	3.11%
Avista Corporation	\$1.60	\$46.54	3.43%
CMS Energy Corporation	\$1.61	\$60.69	2.65%
Duke Energy Corporation	\$3.88	\$90.95	4.27%
Evergy, Inc.	\$2.01	\$63.14	3.19%
IDACORP, Inc.	\$2.62	\$106.33	2.47%
NorthWestern Corporation	\$2.38	\$72.13	3.30%
OGE Energy Corp.	\$1.58	\$43.25	3.65%
Pinnacle West Capital Corporation	\$3.13	\$93.97	3.33%
PNM Resources, Inc.	\$1.37	\$50.34	2.72%
Portland General Electric Company	\$1.60	\$55.68	2.87%
Southern Company	\$2.52	\$57.89	4.36%
Xcel Energy, Inc.	\$1.68	\$62.34	2.70%
Average			3.17%

Proposed Dividend Yield:

Proposed Range of Growth:

4.20% - 5.00%

Indicated Cost of Common Equity:

7.37% - 8.17%

Sources: Column 1 and 2 = Market Intelligence

Column 1 = Expected Annual Dividend based on the sum of equity analysts' expected next four quarters DPS.

Column 3 = Projected Dividend Yield = (Column 1 / Column 2)

Notes: 1 Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

**Union Electric Company
Case No. ER-2019-0335**

**Current Constant-Growth Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases**

Company Name	(1) Expected Annual Dividend	(2) Average High/Low Stock Price	(3) Projected Dividend Yield
Atmos Energy Corporation	\$2.23	\$109.14	2.04%
Northwest Natural Holding Company	\$1.91	\$70.75	2.70%
One Gas, Inc.	\$2.12	\$91.11	2.33%
Southwest Gas Holdings, Inc.	\$2.27	\$89.94	2.53%
Spire, Inc.	\$2.47	\$84.19	2.93%
Average			<u>2.51%</u>
		Proposed Dividend Yield:	2.51%
		Proposed Range of Growth:	<u>4.20% - 5.00%</u>
		Indicated Cost of Common Equity:	<u><u>6.71% - 7.51%</u></u>

Notes: Column 1 = Expected Annual Dividend based on the sum of equity analysts' expected next four quarters DPS.
Column 3 = Projected Dividend Yield = (Column 1 / Column 2)

Union Electric Company
Case No. ER-2019-0335

Constant-Growth Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases

Company Name	(1) Expected Annual Dividend	(2) Average High/Low Stock Price	(3) Projected Dividend Yield
Atmos Energy Corporation	\$1.89	\$82.04	2.31%
Northwest Natural Holding Company	\$1.89	\$60.46	3.13%
One Gas, Inc.	\$1.76	\$69.73	2.52%
Southwest Gas Holdings, Inc.	\$2.03	\$79.89	2.53%
Spire, Inc.	\$2.15	\$69.85	3.07%
Average			<u>2.71%</u>

Proposed Dividend Yield: 2.71%

Proposed Range of Growth: 4.20% - 5.00%

Indicated Cost of Common Equity: 6.91% - 7.71%

Notes: Column 1 = Expected Annual Dividend based on the sum of equity analysts' expected next four quarters DPS.
Column 3 = Projected Dividend Yield = (Column 1 / Column 2)

Source: Case Nos. GR-2017-0215 & GR-2017-0216, Staff Report, Cost of Service, Appendix 2, Shedule 10.

Union Electric Company
ER-2019-0335

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

Company Name	(1) Risk Free Rate	(2) Company's Value Line Beta	(3) Geometric Average Market Risk Premium (1926-2018)	(4) Arithmetic Average Market Risk Premium (1926-2018)	(5) Geometric CAPM Cost of Common Equity (1926-2018)	(6) Arithmetic CAPM Cost of Common Equity (1926-2018)
Alliant Energy Corporation	2.29%	0.55	4.50%	6.00%	4.77%	5.60%
Ameren Corporation ¹	2.29%	0.54	4.50%	6.00%	4.71%	5.52%
American Electric Power Company, Inc.	2.29%	0.49	4.50%	6.00%	4.50%	5.23%
Avista Corporation	2.29%	0.55	4.50%	6.00%	4.77%	5.60%
CMS Energy Corporation	2.29%	0.50	4.50%	6.00%	4.53%	5.27%
Duke Energy Corporation	2.29%	0.46	4.50%	6.00%	4.35%	5.03%
Evergy, Inc.	2.29%	0.40	4.50%	6.00%	4.08%	4.67%
IDACORP, Inc.	2.29%	0.52	4.50%	6.00%	4.62%	5.40%
NorthWestern Corporation	2.29%	0.54	4.50%	6.00%	4.74%	5.56%
OGE Energy Corp.	2.29%	0.73	4.50%	6.00%	5.55%	6.64%
Pinnacle West Capital Corporation	2.29%	0.48	4.50%	6.00%	4.47%	5.19%
PNM Resources, Inc.	2.29%	0.54	4.50%	6.00%	4.74%	5.56%
Portland General Electric Company	2.29%	0.52	4.50%	6.00%	4.62%	5.40%
Southern Company	2.29%	0.46	4.50%	6.00%	4.35%	5.03%
Xcel Energy, Inc.	2.29%	0.46	4.50%	6.00%	4.35%	5.03%
Average		<u>0.52</u>			<u>4.61%</u>	<u>5.38%</u>

Column 1 = The appropriate yield is equal to the average 30-year U.S. Treasury Bond yield for July, August, and September 2019 which was obtained from the St. Louis Federal Reserve website at <http://research.stlouisfed.org/fred2/series/GS30/22>.

Column 2 = Beta is a measure of the movement and relative risk of an individual stock to the market as a whole generate by the SNL Beta Stock Generator September 30, 2014 through September 30, 2019.

Column 3 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 4.50% based on a geometric average as calculated in Duff & Phelps' 2019 SBBI Yearbook.

Column 4 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 6.00% based on an arithmetic average as calculated in Duff & Phelps' 2019 SBBI Yearbook.

Column 5 = (Column 1 + (Column 2 * Column 3))

Column 6 = (Column 1 + (Column 2 * Column 4))

Notes: ¹ Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
ER-2019-0335

Current Capital Asset Pricing Model (CAPM) Costs of Common Equity Estimates
Based on Historical Return Differences Between Common Stocks and Long-Term U.S. Treasuries
for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases

Company Name	(1) Risk Free Rate	(2) Company's Value Line Beta	(3) Geometric Average Market Risk Premium (1926-2018)	(4) Arithmetic Average Market Risk Premium (1926-2018)	(5) Geometric CAPM Cost of Common Equity (1926-2018)	(6) Arithmetic CAPM Cost of Common Equity (1926-2018)
Atmos Energy Corporation	2.29%	0.57	4.50%	6.00%	4.86%	5.72%
Northwest Natural Holding Company	2.29%	0.52	4.50%	6.00%	4.62%	5.40%
One Gas, Inc.	2.29%	0.58	4.50%	6.00%	4.92%	5.80%
Southwest Gas Holdings, Inc.	2.29%	0.63	4.50%	6.00%	5.13%	6.08%
Spire, Inc.	2.29%	0.60	4.50%	6.00%	4.98%	5.88%
Average		<u>0.58</u>			<u>4.90%</u>	<u>5.77%</u>

Column 1 = The appropriate yield is equal to the average 30-year U.S. Treasury Bond yield for July, August and September 2019, which was obtained from the St. Louis Federal Reserve website at <http://research.stlouisfed.org/fred2/series/GS30/22>

Column 2 = Beta is a measure of the movement and relative risk of an individual stock to the market as a whole generate by the SNL Beta Stock Generator September 30, 2014 through September 30, 2019.

Column 3 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 6.00% based on an arithmetic average as calculated in Duff & Phelps' 2019 SBBI Yearbook.

Column 4 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 4.50% based on a geometric average as calculated in Duff & Phelps' 2019 SBBI Yearbook.

Column 5 = (Column 1 + (Column 2 * Column 3)).

Column 6 = (Column 1 + (Column 2 * Column 4)).

**Union Electric Company
ER-2019-0335**

**Capital Asset Pricing Model (CAPM) Costs of Common Equity Estimates Staff Presented in the Spire Rate Cases
Based on Historical Return Differences Between Common Stocks and Long-Term U.S. Treasuries
for the Comparable Gas Utility Companies**

Company Name	(1) Risk Free Rate	(2) Company's Value Line Beta	(3) Geometric Average Market Risk Premium (1926-2016)	(4) Arithmetic Average Market Risk Premium (1926-2016)	(5) Geometric CAPM Cost of Common Equity (1926-2016)	(6) Arithmetic CAPM Cost of Common Equity (1926-2016)
Atmos Energy Corporation	2.90%	0.71	4.50%	6.00%	6.10%	7.17%
Northwest Natural Holding Company	2.90%	0.66	4.50%	6.00%	5.89%	6.89%
One Gas, Inc.	2.90%	0.77	4.50%	6.00%	6.37%	7.53%
Southwest Gas Holdings, Inc.	2.90%	0.71	4.50%	6.00%	6.10%	7.17%
Spire, Inc.	2.90%	0.69	4.50%	6.00%	5.92%	6.93%
Average		0.71			6.08%	7.14%

Source: Case Nos. GR-2017-0215 & GR-2017-0216, Staff Report, Cost of Service, Appendix 2, Shedule 11.

Column 1 = The appropriate yield is equal to the average 30-year U.S. Treasury Bond yield for April, May and June 2017, which was obtained from the St. Louis Federal Reserve website at <http://research.stlouisfed.org/fred2/series/GS30/22>

Column 2 = Beta is a measure of the movement and relative risk of an individual stock to the market as a whole generate by the SNL Beta Stock Generator June 30, 2012 through June 30, 2017.

Column 3 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2016 was determined to be 6.00% based on an arithmetic average as calculated in Valuation Handbook by Duff & Phelps.

Column 4 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2016 was determined to be 4.50% based on a geometric average as calculated in Valuation Handbook by Duff & Phelps.

Column 5 = (Column 1 + (Column 2 * Column 3)).

Column 6 = (Column 1 + (Column 2 * Column 4)).

**Union Electric Company
ER-2019-0335**

Summary of Staff's Cost of Equity Estimates

Staff's Current Cost of Equity Estimates for the Electric Proxy Group

<u>DCF Range of Growth %</u>	<u>4.20%</u>	<u>5.00%</u>	<u>Average</u>
DCF	7.37%	8.17%	7.77%
	<u>Geometric</u>	<u>Arithmetic</u>	<u>Average</u>
CAPM	4.61%	5.38%	5.00%
		Average	6.38%

Staff's Current Cost of Equity Estimates for the Gas Proxy Group

<u>DCF Range of Growth %</u>	<u>4.20%</u>	<u>5.00%</u>	<u>Average</u>
DCF	6.71%	7.51%	7.11%
	<u>Geometric</u>	<u>Arithmetic</u>	<u>Average</u>
CAPM	4.90%	5.77%	5.34%
		Average	6.22%

Staff's Cost of Equity Estimates for the Gas Proxy Group in the Spire Missouri Cases

<u>DCF Range of Growth %</u>	<u>4.20%</u>	<u>5.00%</u>	<u>Average</u>
DCF	6.91%	7.71%	7.31%
	<u>Geometric</u>	<u>Arithmetic</u>	<u>Average</u>
CAPM	6.08%	7.14%	6.61%
		Average	6.96%

Average COE Difference Between Current Electric and Gas Proxy Groups ¹	0.16%
Difference in Average COE for Gas Proxy Group Between Rate Cases ²	-0.74%
Implied COE Differential for Electric Proxy Group	-0.58%
Commission allowed ROE in Spire Missouri rate cases	9.85%
Implied COE Differential for Electric Proxy Group	-0.58%
Staff recommended allowed ROE for Ameren Missouri Electric ³	9.27%

Notes:

1. COE for current Electric Proxy (6.38) - COE for Current Gas Proxy (6.22)
2. COE for Gas Proxy during Spire Missouri rate cases (6.96) - COE for Gas Proxy during current case (6.22)
3. Staff rounded the recommendation down to 9.25%.
4. Staff's estimate of Ameren Missouri's market bases COE is 6.17% $((6.83 + 7.63 + 4.71 + 5.52)/4)$

Union Electric Company
ER-2019-0335

Recommended Allowed Rate of Return as of June 30, 2019
for
Ameren Missouri

Capital Component	Percentage of Capital	Embedded Cost	Allowed Rate of Return Common Equity Return of:		
			8.75%	9.25%	9.75%
Long-Term Debt	49.02%	4.60%	2.26%	2.26%	2.26%
Preferred Stock	0.98%	4.18%	0.04%	0.04%	0.04%
Common Equity	<u>50.00%</u>		<u>4.38%</u>	<u>4.63%</u>	<u>4.88%</u>
Total	<u>100.00%</u>		<u>6.67%</u>	<u>6.92%</u>	<u>7.17%</u>

MISSOURI PUBLIC SERVICE COMMISSION

STAFF REPORT

COST OF SERVICE

APPENDIX 2

**Support for Staff
Cost of
Capital Recommendations**

**UNION ELECTRIC COMPANY,
d/b/a Ameren Missouri**

CASE NO. ER-2019-0335

*Jefferson City, Missouri
December 2019*

AN ANALYSIS OF THE COST OF CAPITAL

FOR

UNION ELECTRIC COMPANY

CASE NO. ER-2019-0335

SCHEDULES

BY

Jeffrey Smith

Financial Analysis

MISSOURI PUBLIC SERVICE COMMISSION

December 2019

**Union Electric Company
Case No. ER-2019-0335**

List of Schedules

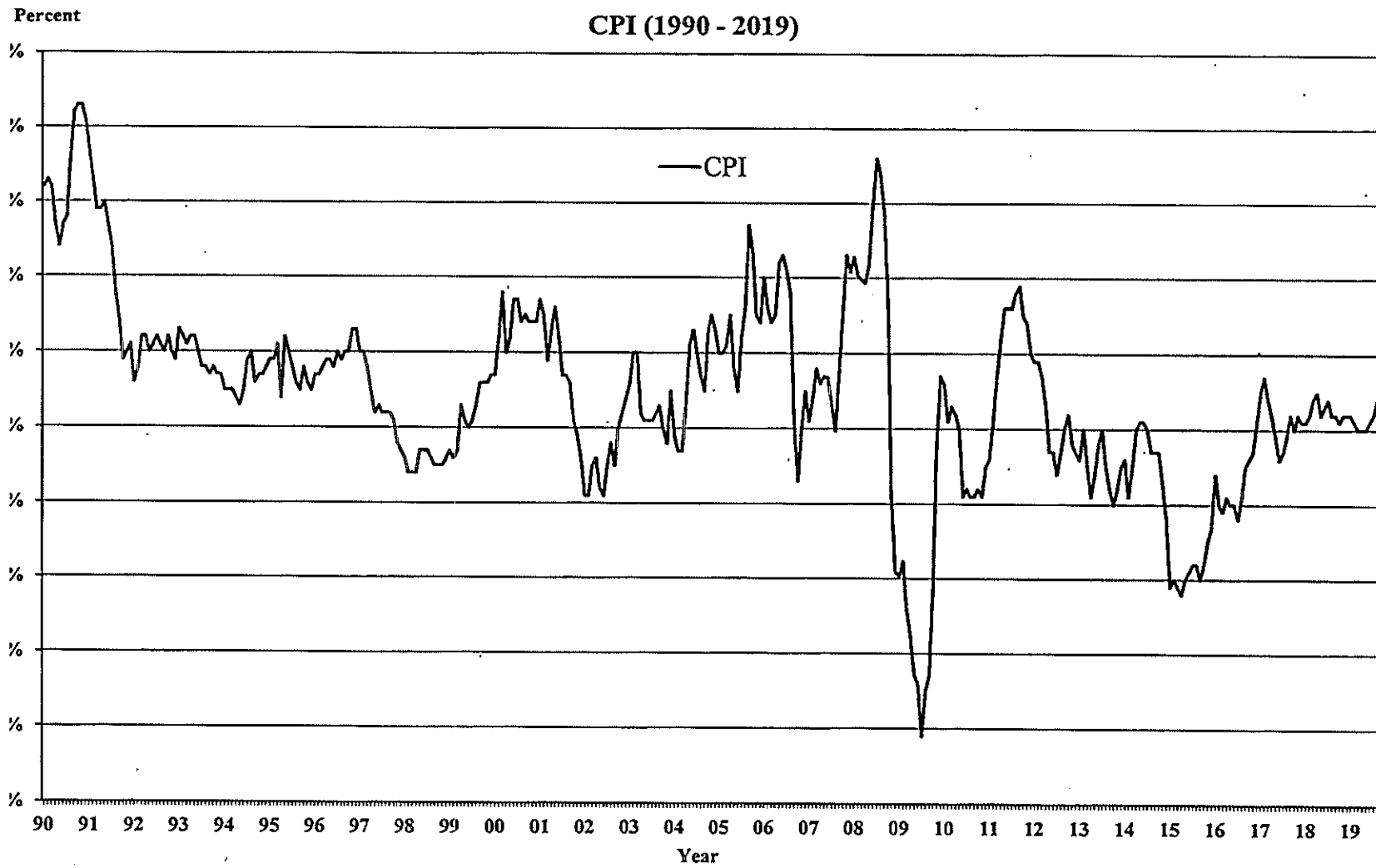
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Union Electric Company
Case No. ER-2019-0335

Consumer Price Index (CPI)		Rate of Inflation							
Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1990	5.20	Jan 1996	2.70	Jan 2002	1.10	Jan 2008	4.30	Jan 2015	-0.10
Feb	5.30	Feb	2.70	Feb	1.10	Feb	4.00	Feb	0.00
Mar	5.20	Mar	2.80	Mar	1.50	Mar	4.00	Mar	-0.10
Apr	4.70	Apr	2.90	Apr	1.60	Apr	3.90	Apr	-0.20
May	4.40	May	2.90	May	1.20	May	4.20	May	0.00
Jun	4.70	Jun	2.80	Jun	1.10	Jun	5.00	Jun	0.10
Jul	4.80	Jul	3.00	Jul	1.50	Jul	5.60	Jul	0.20
Aug	5.60	Aug	2.90	Aug	1.80	Aug	5.40	Aug	0.20
Sep	6.20	Sep	3.00	Sep	1.50	Sep	4.90	Sep	0.00
Oct	6.30	Oct	3.00	Oct	2.00	Oct	3.70	Oct	0.20
Nov	6.30	Nov	3.30	Nov	2.20	Nov	1.10	Nov	0.50
Dec	6.10	Dec	3.30	Dec	2.40	Dec	0.10	Dec	0.70
Jan 1991	5.70	Jan 1997	3.00	Jan 2003	2.60	Jan 2009	0.00	Jan 2016	1.40
Feb	5.30	Feb	3.00	Feb	3.00	Feb	0.20	Feb	1.00
Mar	4.90	Mar	2.80	Mar	3.00	Mar	-0.40	Mar	0.90
Apr	4.90	Apr	2.50	Apr	2.20	Apr	-0.70	Apr	1.10
May	5.00	May	2.20	May	2.10	May	-1.28	May	1.00
Jun	4.70	Jun	2.30	Jun	2.10	Jun	-1.40	Jun	1.00
Jul	4.40	Jul	2.20	Jul	2.10	Jul	-2.10	Jul	0.80
Aug	3.80	Aug	2.20	Aug	2.20	Aug	-1.50	Aug	1.10
Sep	3.40	Sep	2.20	Sep	2.30	Sep	-1.30	Sep	1.50
Oct	2.90	Oct	2.10	Oct	2.00	Oct	-0.20	Oct	1.60
Nov	3.00	Nov	1.80	Nov	1.80	Nov	1.80	Nov	1.70
Dec	3.10	Dec	1.70	Dec	1.90	Dec	2.70	Dec	2.10
Jan 1992	2.60	Jan 1998	1.60	Jan 2004	1.90	Jan 2010	2.60	Jan 2017	2.50
Feb	2.80	Feb	1.40	Feb	1.70	Feb	2.10	Feb	2.70
Mar	3.20	Mar	1.40	Mar	1.70	Mar	2.30	Mar	2.40
Apr	3.20	Apr	1.40	Apr	2.30	April	2.20	Apr	2.20
May	3.00	May	1.70	May	3.10	May	2.00	May	1.90
Jun	3.10	Jun	1.70	Jun	3.30	Jun	1.10	Jun	1.60
Jul	3.20	Jul	1.70	Jul	3.00	Jul	1.20	Jul	1.70
Aug	3.10	Aug	1.60	Aug	2.70	Aug	1.10	Aug	1.90
Sep	3.00	Sep	1.50	Sep	2.50	Sep	1.10	Sep	2.20
Oct	3.20	Oct	1.50	Oct	3.30	Oct	1.20	Oct	2.00
Nov	3.00	Nov	1.50	Nov	3.50	Nov	1.10	Nov	2.20
Dec	2.90	Dec	1.60	Dec	3.30	Dec	1.50	Dec	2.10
Jan 1993	3.30	Jan 1999	1.70	Jan 2005	3.00	Jan 2011	1.60	Jan 2018	2.10
Feb	3.20	Feb	1.60	Feb	3.00	Feb	2.10	Feb	2.20
Mar	3.10	Mar	1.70	Mar	3.10	Mar	2.70	Mar	2.40
Apr	3.20	Apr	2.30	Apr	3.50	Apr	3.20	Apr	2.50
May	3.20	May	2.10	May	2.80	May	3.60	May	2.20
Jun	3.00	Jun	2.00	Jun	2.50	Jun	3.60	Jun	2.30
Jul	2.80	Jul	2.10	Jul	3.20	Jul	3.60	Jul	2.40
Aug	2.80	Aug	2.30	Aug	3.60	Aug	3.80	Aug	2.20
Sep	2.70	Sep	2.60	Sep	4.70	Sep	3.90	Sep	2.20
Oct	2.80	Oct	2.60	Oct	4.30	Oct	3.50	Oct	2.10
Nov	2.70	Nov	2.60	Nov	3.50	Nov	3.40	Nov	2.20
Dec	2.70	Dec	2.70	Dec	3.40	Dec	3.00	Dec	2.20
Jan 1994	2.50	Jan 2000	2.70	Jan 2006	4.00	Jan 2012	2.90	Jan 2019	2.20
Feb	2.50	Feb	3.20	Feb	3.60	Feb	2.90	Feb	2.10
Mar	2.50	Mar	3.70	Mar	3.40	Mar	2.70	Mar	2.20
Apr	2.40	Apr	3.00	Apr	3.50	Apr	2.30	Apr	2.00
May	2.30	May	3.20	May	4.20	May	1.70	May	2.00
Jun	2.50	Jun	3.70	Jun	4.30	Jun	1.70	Jun	2.10
Jul	2.90	Jul	3.70	Jul	4.10	Jul	1.40	Jul	2.20
Aug	3.00	Aug	3.40	Aug	3.80	Aug	1.70	Aug	2.40
Sep	2.60	Sep	3.50	Sep	2.10	Sep	2.00	Sep	2.40
Oct	2.70	Oct	3.40	Oct	1.30	Oct	2.20		
Nov	2.70	Nov	3.40	Nov	2.00	Nov	1.80		
Dec	2.80	Dec	3.40	Dec	2.50	Dec	1.70		
Jan 1995	2.90	Jan 2001	3.70	Jan 2007	2.10	Jan 2013	1.60		
Feb	2.90	Feb	3.50	Feb	2.40	Feb	2.00		
Mar	3.10	Mar	2.90	Mar	2.80	Mar	1.50		
Apr	2.40	Apr	3.30	Apr	2.60	Apr	1.10		
May	3.20	May	3.60	May	2.70	May	1.40		
Jun	3.00	Jun	3.20	Jun	2.70	Jun	1.80		
Jul	2.80	Jul	2.70	Jul	2.40	Jul	2.00		
Aug	2.60	Aug	2.70	Aug	2.00	Aug	1.50		
Sep	2.50	Sep	2.60	Sep	2.80	Sept	1.20		
Oct	2.80	Oct	2.10	Oct	3.50	Oct	1.00		
Nov	2.60	Nov	1.90	Nov	4.30	Nov	1.20		
Dec	2.50	Dec	1.60	Dec	4.10	Dec	1.50		

Source: U.S. Dept of Labor, Bureau of Labor Statistics, Consumer Price Index - All Urban Consumers, Change for 12-Month Period, Bureau of Labor Statistics, http://www.bls.gov/schedule/archives/cpi_ar.htm

Union Electric Company
Case No. ER-2019-0335



**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jan-90		8.09	8.12	8.21	8.26	0.03	0.12	0.17	0.09	0.14	0.05
Feb-90		8.37	8.42	8.47	8.50	0.05	0.10	0.13	0.05	0.08	0.03
Mar-90		8.63	8.60	8.59	8.56	<u>-0.03</u>	<u>-0.04</u>	<u>-0.06</u>	<u>-0.01</u>	<u>-0.04</u>	<u>-0.03</u>
Apr-90		8.72	8.77	8.79	8.76	0.04	0.06	0.03	0.02	<u>-0.01</u>	<u>-0.03</u>
May-90		8.64	8.74	8.76	8.73	0.09	0.12	0.09	0.02	0.00	<u>-0.03</u>
Jun-90		8.35	8.43	8.48	8.46	0.08	0.13	0.11	0.05	0.03	<u>-0.02</u>
Jul-90	8	8.16	8.33	8.47	8.50	0.17	0.31	0.34	0.14	0.17	0.03
Aug-90	8	8.06	8.44	8.75	8.86	0.38	0.69	0.80	0.32	0.43	0.11
Sep-90	8	8.08	8.51	8.89	9.03	0.43	0.81	0.95	0.38	0.52	0.14
Oct-90	7.75	7.88	8.33	8.72	8.86	0.45	0.84	0.98	0.39	0.53	0.14
Nov-90	7.5	7.60	8.02	8.39	8.54	0.42	0.79	0.94	0.37	0.52	0.15
Dec-90	7	7.31	7.73	8.08	8.24	0.41	0.76	0.92	0.35	0.51	0.16
Jan-91	6.75	7.13	7.70	8.09	8.27	0.57	0.97	1.14	0.39	0.57	0.18
Feb-91	6.25	6.87	7.47	7.85	8.03	0.61	0.99	1.17	0.38	0.56	0.18
Mar-91	6	7.10	7.77	8.11	8.29	0.67	1.01	1.19	0.34	0.52	0.18
Apr-91	6	6.95	7.70	8.04	8.21	0.75	1.09	1.26	0.34	0.51	0.17
May-91	5.75	6.78	7.70	8.07	8.27	0.92	1.28	1.48	0.37	0.57	0.20
Jun-91	5.75	6.96	7.94	8.28	8.47	0.98	1.33	1.52	0.35	0.53	0.19
Jul-91	5.75	6.92	7.91	8.27	8.45	0.99	1.36	1.53	0.36	0.54	0.18
Aug-91	5.5	6.43	7.43	7.90	8.14	0.99	1.47	1.71	0.48	0.72	0.24
Sep-91	5.25	6.18	7.14	7.65	7.95	0.95	1.47	1.77	0.51	0.81	0.30
Oct-91	5	5.91	6.87	7.53	7.93	0.96	1.62	2.02	0.66	1.06	0.40
Nov-91	4.75	5.56	6.62	7.42	7.92	1.06	1.86	2.36	0.80	1.30	0.50
Dec-91	4.5	5.03	6.19	7.09	7.70	1.16	2.06	2.68	0.90	1.52	0.61
Jan-92	4	4.96	6.24	7.03	7.58	1.28	2.07	2.62	0.79	1.34	0.55
Feb-92	4	5.21	6.58	7.34	7.85	1.37	2.13	2.64	0.76	1.28	0.52
Mar-92	4	5.69	6.95	7.54	7.97	1.26	1.86	2.28	0.60	1.02	0.43
Apr-92	3.75	5.34	6.78	7.48	7.96	1.44	2.14	2.62	0.70	1.18	0.48
May-92	3.75	5.23	6.69	7.39	7.89	1.47	2.17	2.67	0.70	1.20	0.50
Jun-92	3.75	5.05	6.48	7.26	7.84	1.43	2.21	2.79	0.78	1.36	0.58
Jul-92	3.25	4.36	5.84	6.84	7.60	1.48	2.49	3.24	1.01	1.76	0.75
Aug-92	3.25	4.19	5.60	6.59	7.39	1.40	2.39	3.20	0.99	1.79	0.80
Sep-92	3	3.89	5.38	6.42	7.34	1.49	2.52	3.45	1.04	1.96	0.93
Oct-92	3	4.08	5.60	6.59	7.53	1.52	2.51	3.45	0.99	1.93	0.94
Nov-92	3	4.58	6.04	6.87	7.61	1.46	2.29	3.03	0.84	1.57	0.73
Dec-92	3	4.67	6.08	6.77	7.44	1.40	2.10	2.76	0.69	1.36	0.67
Jan-93	3	4.39	5.83	6.60	7.34	1.44	2.21	2.95	0.77	1.51	0.74
Feb-93	3	4.10	5.43	6.26	7.09	1.33	2.16	2.99	0.83	1.66	0.83
Mar-93	3	3.95	5.19	5.98	6.82	1.25	2.03	2.87	0.78	1.63	0.85
Apr-93	3	3.84	5.13	5.97	6.85	1.30	2.13	3.02	0.84	1.72	0.88
May-93	3	3.98	5.20	6.04	6.92	1.22	2.06	2.94	0.84	1.72	0.88
Jun-93	3	4.16	5.22	5.96	6.81	1.05	1.80	2.64	0.75	1.59	0.84
Jul-93	3	4.07	5.09	5.81	6.63	1.02	1.73	2.55	0.71	1.53	0.82
Aug-93	3	4.00	5.03	5.68	6.32	1.02	1.68	2.32	0.65	1.30	0.65
Sep-93	3	3.85	4.73	5.36	6.00	0.89	1.51	2.15	0.63	1.26	0.64
Oct-93	3	3.87	4.71	5.33	5.94	0.83	1.46	2.06	0.63	1.23	0.61
Nov-93	3	4.16	5.06	5.72	6.21	0.91	1.57	2.05	0.66	1.15	0.49
Dec-93	3	4.21	5.15	5.77	6.25	0.93	1.56	2.04	0.63	1.11	0.48
Jan-94	3	4.14	5.09	5.75	6.29	0.95	1.61	2.15	0.66	1.20	0.54

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Feb-94	3.25	4.47	5.40	5.97	6.49	0.92	1.50	2.02	0.58	1.10	0.52
Mar-94	3.5	5.00	5.94	6.48	6.91	0.95	1.49	1.91	0.54	0.97	0.42
Apr-94	3.75	5.55	6.52	6.97	7.27	0.97	1.42	1.72	0.45	0.74	0.30
May-94	4.25	5.97	6.78	7.18	7.41	0.81	1.22	1.44	0.40	0.63	0.23
Jun-94	4.25	5.93	6.70	7.10	7.40	0.76	1.17	1.46	0.41	0.70	0.29
Jul-94	4.25	6.13	6.91	7.30	7.58	0.78	1.17	1.45	0.39	0.67	0.28
Aug-94	4.75	6.18	6.88	7.24	7.49	0.70	1.06	1.31	0.36	0.61	0.25
Sep-94	4.75	6.39	7.08	7.46	7.71	0.69	1.06	1.32	0.37	0.63	0.26
Oct-94	4.75	6.73	7.40	7.74	7.94	0.67	1.02	1.21	0.34	0.53	0.19
Nov-94	5.5	7.15	7.72	7.96	8.08	0.57	0.81	0.93	0.24	0.36	0.13
Dec-94	5.5	7.59	7.78	7.81	7.87	0.19	0.22	0.28	0.04	0.10	0.06
Jan-95	5.5	7.51	7.76	7.78	7.85	0.25	0.27	0.34	0.02	0.09	0.07
Feb-95	6	7.11	7.37	7.47	7.61	0.25	0.36	0.50	0.10	0.25	0.14
Mar-95	6	6.78	7.05	7.20	7.45	0.27	0.43	0.67	0.16	0.40	0.24
Apr-95	6	6.57	6.86	7.06	7.36	0.29	0.49	0.79	0.20	0.50	0.30
May-95	6	6.17	6.41	6.63	6.95	0.24	0.46	0.78	0.22	0.54	0.32
Jun-95	6	5.72	5.93	6.17	6.57	0.21	0.45	0.86	0.24	0.64	0.41
Jul-95	5.75	5.78	6.01	6.28	6.72	0.23	0.50	0.94	0.27	0.71	0.44
Aug-95	5.75	5.98	6.24	6.49	6.86	0.26	0.51	0.88	0.24	0.62	0.37
Sep-95	5.75	5.81	6.00	6.20	6.55	0.20	0.39	0.74	0.20	0.55	0.35
Oct-95	5.75	5.70	5.86	6.04	6.37	0.17	0.35	0.68	0.18	0.51	0.33
Nov-95	5.75	5.48	5.69	5.93	6.26	0.22	0.45	0.78	0.24	0.57	0.33
Dec-95	5.75	5.32	5.51	5.71	6.06	0.19	0.39	0.74	0.20	0.55	0.35
Jan-96	5.5	5.11	5.36	5.65	6.05	0.25	0.54	0.94	0.29	0.69	0.40
Feb-96	5.25	5.03	5.38	5.81	6.24	0.35	0.78	1.22	0.43	0.86	0.44
Mar-96	5.25	5.66	5.97	6.27	6.60	0.31	0.61	0.94	0.30	0.64	0.34
Apr-96	5.5	5.96	6.30	6.51	6.79	0.34	0.55	0.84	0.21	0.49	0.28
May-96	5.5	6.10	6.48	6.74	6.93	0.39	0.64	0.83	0.25	0.44	0.19
Jun-96	5.5	6.30	6.69	6.91	7.06	0.39	0.62	0.76	0.22	0.37	0.15
Jul-96	5.5	6.27	6.64	6.87	7.03	0.37	0.60	0.76	0.23	0.40	0.17
Aug-96	5.5	6.03	6.39	6.64	6.84	0.36	0.61	0.81	0.25	0.45	0.21
Sep-96	5.5	6.23	6.60	6.83	7.03	0.36	0.60	0.79	0.23	0.43	0.19
Oct-96	5.5	5.91	6.27	6.53	6.81	0.36	0.62	0.90	0.26	0.54	0.28
Nov-96	5.5	5.70	5.97	6.20	6.48	0.27	0.50	0.78	0.23	0.51	0.28
Dec-96	5.5	5.78	6.07	6.30	6.55	0.29	0.52	0.77	0.23	0.48	0.25
Jan-97	5.5	6.01	6.33	6.58	6.83	0.33	0.57	0.82	0.25	0.49	0.25
Feb-97	5.5	5.90	6.20	6.42	6.69	0.30	0.52	0.79	0.22	0.49	0.27
Mar-97	5.5	6.22	6.54	6.69	6.93	0.32	0.47	0.71	0.16	0.40	0.24
Apr-97	5.5	6.45	6.76	6.89	7.09	0.31	0.44	0.64	0.13	0.33	0.21
May-97	5.5	6.28	6.57	6.71	6.94	0.29	0.43	0.66	0.14	0.37	0.22
Jun-97	5.5	6.09	6.38	6.49	6.77	0.28	0.40	0.68	0.12	0.40	0.28
Jul-97	5.5	5.89	6.12	6.22	6.51	0.23	0.33	0.62	0.10	0.39	0.29
Aug-97	5.5	5.94	6.16	6.30	6.58	0.22	0.36	0.64	0.14	0.42	0.28
Sep-97	5.5	5.88	6.11	6.21	6.50	0.22	0.33	0.61	0.10	0.39	0.29
Oct-97	5.5	5.77	5.93	6.03	6.33	0.16	0.26	0.55	0.10	0.40	0.30
Nov-97	5.5	5.71	5.80	5.88	6.11	0.09	0.16	0.40	0.07	0.31	0.23
Dec-97	5.5	5.72	5.77	5.81	5.99	0.06	0.09	0.28	0.04	0.22	0.18
Jan-98	5.5	5.36	5.42	5.54	5.81	0.06	0.19	0.45	0.13	0.40	0.27
Feb-98	5.5	5.42	5.49	5.57	5.89	0.07	0.16	0.47	0.08	0.40	0.32

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Mar-98	5.5	5.56	5.61	5.65	5.95	0.05	0.09	0.39	0.04	0.34	0.30
Apr-98	5.5	5.56	5.61	5.64	5.92	0.05	0.07	0.36	0.03	0.31	0.29
May-98	5.5	5.59	5.63	5.65	5.93	0.03	0.06	0.33	0.02	0.30	0.27
Jun-98	5.5	5.52	5.52	5.50	5.70	0.00	<u>-0.02</u>	0.18	<u>-0.03</u>	0.18	0.21
Jul-98	5.5	5.46	5.46	5.46	5.68	0.00	0.00	0.22	0.00	0.22	0.22
Aug-98	5.5	5.27	5.27	5.34	5.54	0.01	0.07	0.27	0.07	0.27	0.20
Sep-98	5.25	4.67	4.62	4.81	5.20	<u>-0.04</u>	0.14	0.54	0.18	0.58	0.40
Oct-98	5	4.09	4.18	4.53	5.01	0.09	0.44	0.92	0.35	0.83	0.48
Nov-98	4.75	4.54	4.54	4.83	5.25	0.00	0.29	0.71	0.29	0.71	0.42
Dec-98	4.75	4.51	4.45	4.65	5.06	<u>-0.06</u>	0.14	0.55	0.19	0.61	0.41
Jan-99	4.75	4.62	4.60	4.72	5.16	<u>-0.01</u>	0.11	0.54	0.12	0.56	0.44
Feb-99	4.75	4.88	4.91	5.00	5.37	0.04	0.12	0.49	0.08	0.45	0.37
Mar-99	4.75	5.05	5.14	5.23	5.58	0.09	0.18	0.53	0.09	0.44	0.35
Apr-99	4.75	4.98	5.08	5.18	5.55	0.10	0.21	0.57	0.11	0.47	0.36
May-99	4.75	5.25	5.44	5.54	5.81	0.18	0.29	0.55	0.10	0.37	0.27
Jun-99	4.75	5.62	5.81	5.90	6.04	0.19	0.28	0.42	0.09	0.23	0.14
Jul-99	5	5.55	5.68	5.79	5.98	0.12	0.24	0.43	0.11	0.30	0.19
Aug-99	5	5.68	5.84	5.94	6.07	0.16	0.26	0.39	0.10	0.23	0.13
Sep-99	5.25	5.66	5.80	5.92	6.07	0.14	0.25	0.41	0.11	0.27	0.16
Oct-99	5.25	5.86	6.03	6.11	6.26	0.17	0.25	0.40	0.08	0.23	0.15
Nov-99	5.25	5.86	5.97	6.03	6.15	0.11	0.17	0.28	0.06	0.18	0.11
Dec-99	5.5	6.10	6.19	6.28	6.35	0.08	0.17	0.25	0.09	0.17	0.08
Jan-00	5.50	6.44	6.58	6.66	6.63	0.14	0.22	0.19	0.08	0.05	<u>-0.04</u>
Feb-00	5.75	6.61	6.68	6.52	6.23	0.07	<u>-0.09</u>	<u>-0.38</u>	<u>-0.16</u>	<u>-0.45</u>	<u>-0.29</u>
Mar-00	5.75	6.53	6.50	6.26	6.05	<u>-0.02</u>	<u>-0.27</u>	<u>-0.47</u>	<u>-0.25</u>	<u>-0.45</u>	<u>-0.20</u>
Apr-00	6	6.40	6.26	5.99	5.85	<u>-0.14</u>	<u>-0.41</u>	<u>-0.56</u>	<u>-0.27</u>	<u>-0.42</u>	<u>-0.14</u>
May-00	6	6.81	6.69	6.44	6.15	<u>-0.12</u>	<u>-0.37</u>	<u>-0.66</u>	<u>-0.25</u>	<u>-0.54</u>	<u>-0.29</u>
Jun-00	6.5	6.48	6.30	6.10	5.93	<u>-0.18</u>	<u>-0.38</u>	<u>-0.56</u>	<u>-0.20</u>	<u>-0.37</u>	<u>-0.17</u>
Jul-00	6.5	6.34	6.18	6.05	5.85	<u>-0.16</u>	<u>-0.29</u>	<u>-0.49</u>	<u>-0.13</u>	<u>-0.33</u>	<u>-0.20</u>
Aug-00	6.5	6.23	6.06	5.83	5.72	<u>-0.17</u>	<u>-0.40</u>	<u>-0.51</u>	<u>-0.23</u>	<u>-0.34</u>	<u>-0.11</u>
Sep-00	6.5	6.08	5.93	5.80	5.83	<u>-0.15</u>	<u>-0.28</u>	<u>-0.26</u>	<u>-0.14</u>	<u>-0.11</u>	0.03
Oct-00	6.5	5.91	5.78	5.74	5.80	<u>-0.13</u>	<u>-0.17</u>	<u>-0.11</u>	<u>-0.04</u>	0.02	0.06
Nov-00	6.5	5.88	5.70	5.72	5.78	<u>-0.18</u>	<u>-0.16</u>	<u>-0.10</u>	0.02	0.08	0.06
Dec-00	6.5	5.35	5.17	5.24	5.49	<u>-0.18</u>	<u>-0.11</u>	0.14	0.07	0.32	0.25
Jan-01	6	4.76	4.86	5.16	5.54	0.10	0.40	0.78	0.30	0.68	0.38
Feb-01	5.5	4.66	4.89	5.10	5.45	0.23	0.44	0.80	0.21	0.57	0.36
Mar-01	5.5	4.34	4.64	4.89	5.34	0.30	0.54	1.00	0.24	0.70	0.45
Apr-01	5	4.23	4.76	5.14	5.65	0.53	0.91	1.41	0.38	0.88	0.51
May-01	4.5	4.26	4.93	5.39	5.78	0.67	1.13	1.52	0.46	0.85	0.39
Jun-01	4	4.08	4.81	5.28	5.67	0.73	1.20	1.59	0.48	0.86	0.39
Jul-01	3.75	4.04	4.76	5.24	5.61	0.72	1.20	1.57	0.47	0.85	0.38
Aug-01	3.5	3.76	4.57	4.97	5.48	0.82	1.21	1.73	0.40	0.91	0.51
Sep-01	3	3.12	4.12	4.73	5.48	1.00	1.61	2.36	0.62	1.37	0.75
Oct-01	2.5	2.73	3.91	4.57	5.32	1.18	1.84	2.59	0.66	1.41	0.75
Nov-01	2	2.78	3.97	4.65	5.12	1.19	1.87	2.34	0.68	1.15	0.47
Dec-01	1.75	3.11	4.39	5.09	5.48	1.28	1.98	2.37	0.70	1.09	0.39
Jan-02	1.75	3.03	4.34	5.04	5.45	1.31	2.01	2.42	0.70	1.11	0.41
Feb-02	1.75	3.02	4.30	4.91	5.40	1.28	1.90	2.39	0.61	1.10	0.49
Mar-02	1.75	3.56	4.74	5.28	0	1.18	1.73		0.55		

Union Electric Company
Case No. ER-2019-0335

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Apr-02	1.75	3.42	4.65	5.21	0	1.22	1.79		0.56		
May-02	1.75	3.26	4.49	5.16	0	1.23	1.90		0.67		
Jun-02	1.75	2.99	4.19	4.93	0	1.19	1.93		0.74		
Jul-02	1.75	2.56	3.81	4.65	0	1.25	2.10		0.85		
Aug-02	1.75	2.13	3.29	4.26	0	1.16	2.12		0.96		
Sep-02	1.75	2.00	2.94	3.87	0	0.93	1.87		0.93		
Oct-02	1.75	1.91	2.95	3.94	0	1.03	2.03		1.00		
Nov-02	1.25	1.92	3.05	4.05	0	1.13	2.13		0.99		
Dec-02	1.25	1.84	3.03	4.03	0	1.20	2.20		1.00		
Jan-03	1.25	1.74	3.05	4.05	0	1.31	2.31		1.00		
Feb-03	1.25	1.63	2.90	3.90	0	1.27	2.27		1.00		
Mar-03	1.25	1.57	2.78	3.81	0	1.21	2.23		1.02		
Apr-03	1.25	1.62	2.93	3.96	0	1.31	2.34		1.03		
May-03	1.25	1.42	2.52	3.57	0	1.10	2.15		1.05		
Jun-03	1.25	1.23	2.27	3.33	0	1.04	2.11		1.07		
Jul-03	1	1.47	2.87	3.98	0	1.40	2.50		1.10		
Aug-03	1	1.86	3.37	4.45	0	1.51	2.58		1.08		
Sep-03	1	1.71	3.18	4.27	0	1.48	2.57		1.09		
Oct-03	1	1.75	3.19	4.29	0	1.44	2.54		1.10		
Nov-03	1	1.93	3.29	4.30	0	1.36	2.37		1.01		
Dec-03	1	1.91	3.27	4.27	0	1.36	2.36		1.00		
Jan-04	1	1.76	3.12	4.15	0	1.36	2.39		1.03		
Feb-04	1	1.74	3.07	4.08	0	1.33	2.34		1.02		
Mar-04	1	1.58	2.79	3.83	0	1.21	2.25		1.04		
Apr-04	1	2.07	3.39	4.35	0	1.32	2.28		0.96		
May-04	1	2.53	3.85	4.72	0	1.32	2.18		0.87		
Jun-04	1	2.76	3.93	4.73	0	1.17	1.97		0.80		
Jul-04	1.25	2.64	3.69	4.50	0	1.05	1.86		0.81		
Aug-04	1.25	2.51	3.47	4.28	0	0.97	1.77		0.81		
Sep-04	1.5	2.53	3.36	4.13	0	0.83	1.60		0.77		
Oct-04	1.75	2.58	3.35	4.10	0	0.76	1.51		0.75		
Nov-04	2	2.85	3.53	4.19	0	0.67	1.34		0.67		
Dec-04	2.25	3.01	3.60	4.23	0	0.59	1.22		0.63		
Jan-05	2.25	3.22	3.71	4.22	0	0.48	1.00		0.51		
Feb-05	2.5	3.38	3.77	4.17	0	0.38	0.78		0.40		
Mar-05	2.5	3.73	4.17	4.50	0	0.44	0.77		0.33		
Apr-05	2.75	3.65	4.00	4.34	0	0.34	0.69		0.34		
May-05	3	3.64	3.85	4.14	0	0.21	0.50		0.29		
Jun-05	3	3.64	3.77	4.00	0	0.13	0.36		0.23		
Jul-05	3.25	3.87	3.98	4.18	0	0.11	0.31		0.20		
Aug-05	3.5	4.04	4.12	4.26	0	0.08	0.22		0.14		
Sep-05	3.5	3.95	4.01	4.20	0	0.06	0.25		0.19		
Oct-05	3.75	4.27	4.33	4.46	0	0.06	0.19		0.14		
Nov-05	4	4.42	4.45	4.54	0	0.04	0.12		0.08		
Dec-05	4.25	4.40	4.39	4.47	0	<u>-0.01</u>	0.06		0.07		
Jan-06	4.25	4.40	4.35	4.42	0	<u>-0.05</u>	0.02		0.07		
Feb-06	4.5	4.67	4.57	4.57	4.54	<u>-0.10</u>	<u>-0.10</u>	<u>-0.13</u>	0.00	<u>-0.04</u>	<u>-0.03</u>
Mar-06	4.5	4.73	4.72	4.72	4.73	<u>-0.02</u>	<u>-0.01</u>	0.00	0.01	0.02	0.01
Apr-06	4.75	4.89	4.90	4.99	5.06	0.01	0.10	0.17	0.09	0.16	0.07

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
May-06	5	4.97	5.00	5.11	5.20	0.03	0.14	0.23	0.11	0.20	0.09
Jun-06	5	5.12	5.07	5.11	5.15	<u>-0.05</u>	<u>-0.02</u>	0.03	0.04	0.09	0.05
Jul-06	5.25	5.12	5.04	5.09	5.13	<u>-0.08</u>	<u>-0.03</u>	0.02	0.05	0.09	0.05
Aug-06	5.25	4.90	4.82	4.88	5.00	<u>-0.08</u>	<u>-0.03</u>	0.09	0.05	0.17	0.12
Sep-06	5.25	4.77	4.67	4.72	4.85	<u>-0.10</u>	<u>-0.05</u>	0.08	0.05	0.18	0.13
Oct-06	4.75	4.80	4.69	4.73	4.85	<u>-0.11</u>	<u>-0.07</u>	0.06	0.04	0.17	0.13
Nov-06	4.5	4.74	4.58	4.60	4.69	<u>-0.16</u>	<u>-0.15</u>	<u>-0.05</u>	0.01	0.10	0.09
Dec-06	4.25	4.67	4.53	4.56	4.68	<u>-0.14</u>	<u>-0.11</u>	0.01	0.03	0.15	0.12
Jan-07	4.25	4.88	4.75	4.76	4.85	<u>-0.12</u>	<u>-0.12</u>	<u>-0.02</u>	0.01	0.10	0.09
Feb-07	3	4.85	4.71	4.72	4.82	<u>-0.14</u>	<u>-0.13</u>	<u>-0.03</u>	0.01	0.11	0.10
Mar-07	3	4.57	4.48	4.56	4.72	<u>-0.09</u>	<u>-0.01</u>	0.15	0.08	0.24	0.16
Apr-07	2.25	4.67	4.59	4.69	4.87	<u>-0.07</u>	0.03	0.20	0.10	0.27	0.17
May-07	2	4.77	4.67	4.75	4.90	<u>-0.10</u>	<u>-0.02</u>	0.14	0.08	0.23	0.16
Jun-07	2	4.98	5.03	5.10	5.20	0.05	0.12	0.22	0.08	0.18	0.10
Jul-07	2	4.82	4.88	5.00	5.11	0.07	0.19	0.29	0.12	0.22	0.10
Aug-07	2	4.31	4.43	4.67	4.93	0.12	0.36	0.62	0.24	0.50	0.26
Sep-07	2	4.01	4.20	4.52	4.79	0.19	0.51	0.78	0.32	0.59	0.27
Oct-07	1.5	3.97	4.20	4.53	4.77	0.23	0.56	0.81	0.33	0.58	0.25
Nov-07	1	3.34	3.67	4.15	4.52	0.33	0.81	1.18	0.48	0.85	0.37
Dec-07	1	3.12	3.49	4.10	4.53	0.37	0.98	1.41	0.61	1.04	0.43
Jan-08	0.25	2.48	2.98	3.74	4.33	0.50	1.27	1.85	0.76	1.35	0.59
Feb-08	0.25	1.97	2.78	3.74	4.52	0.81	1.76	2.54	0.96	1.74	0.78
Mar-08	0.25	1.62	2.48	3.51	4.39	0.87	1.89	2.78	1.03	1.91	0.88
Apr-08	0.25	2.05	2.84	3.68	4.44	0.79	1.63	2.40	0.83	1.60	0.77
May-08	0.25	2.45	3.15	3.88	4.60	0.71	1.43	2.15	0.73	1.44	0.72
Jun-08	0.25	2.77	3.49	4.10	4.69	0.71	1.33	1.92	0.61	1.20	0.59
Jul-08	0.25	2.57	3.30	4.01	4.57	0.73	1.43	2.00	0.70	1.27	0.56
Aug-08	0.25	2.42	3.14	3.89	4.50	0.72	1.47	2.08	0.74	1.36	0.62
Sep-08	0.25	2.08	2.88	3.69	4.27	0.81	1.61	2.19	0.80	1.38	0.58
Oct-08	0.25	1.61	2.73	3.81	4.17	1.11	2.20	2.56	1.09	1.45	0.36
Nov-08	0.25	1.21	2.29	3.53	4.00	1.08	2.31	2.79	1.24	1.71	0.48
Dec-08	0.25	0.82	1.52	2.42	2.87	0.70	1.60	2.05	0.89	1.35	0.45
Jan-09	0.25	0.81	1.60	2.52	3.13	0.79	1.71	2.32	0.92	1.53	0.61
Feb-09	0.25	0.98	1.87	2.87	3.59	0.90	1.89	2.61	1.00	1.72	0.72
Mar-09	0.25	0.93	1.82	2.82	3.64	0.88	1.89	2.71	1.00	1.83	0.82
Apr-09	0.25	0.93	1.86	2.93	3.76	0.93	2.00	2.83	1.07	1.90	0.83
May-09	0.25	0.93	2.13	3.29	4.23	1.20	2.36	3.30	1.16	2.09	0.93
Jun-09	0.25	1.18	2.71	3.72	4.52	1.52	2.54	3.33	1.02	1.81	0.79
Jul-09	0.25	1.02	2.46	3.56	4.41	1.44	2.54	3.39	1.10	1.94	0.84
Aug-09	0.25	1.12	2.57	3.59	4.37	1.46	2.47	3.26	1.02	1.80	0.78
Sep-09	0.25	0.96	2.37	3.40	4.19	1.41	2.45	3.23	1.03	1.82	0.78
Oct-09	0.25	0.95	2.33	3.39	4.19	1.38	2.44	3.24	1.05	1.86	0.80
Nov-09	0.25	0.80	2.23	3.40	4.31	1.43	2.60	3.51	1.17	2.08	0.91
Dec-09	0.25	0.87	2.34	3.59	4.49	1.47	2.72	3.62	1.25	2.15	0.90
Jan-10	0.25	0.93	2.48	3.73	4.60	1.56	2.80	3.68	1.25	2.12	0.87
Feb-10	0.25	0.86	2.36	3.69	4.62	1.51	2.83	3.76	1.33	2.26	0.93
Mar-10	0.25	0.96	2.43	3.73	4.64	1.47	2.77	3.69	1.29	2.21	0.92
Apr-10	0.25	1.06	2.58	3.85	4.69	1.52	2.79	3.63	1.27	2.11	0.85
May-10	0.25	0.83	2.18	3.42	4.29	1.35	2.59	3.46	1.24	2.11	0.87

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jun-10	0.25	0.72	2.00	3.20	4.13	1.27	2.48	3.40	1.21	2.13	0.92
Jul-10	0.25	0.62	1.76	3.01	3.99	1.15	2.39	3.38	1.25	2.23	0.98
Aug-10	0.25	0.52	1.47	2.70	3.80	0.95	2.18	3.28	1.23	2.34	1.10
Sep-10	0.25	0.48	1.41	2.65	3.77	0.93	2.17	3.29	1.24	2.36	1.13
Oct-10	0.25	0.38	1.18	2.54	3.87	0.81	2.16	3.50	1.36	2.69	1.33
Nov-10	0.25	0.45	1.35	2.76	4.19	0.90	2.31	3.73	1.41	2.84	1.42
Dec-10	0.25	0.62	1.93	3.29	4.42	1.32	2.67	3.80	1.36	2.48	1.13
Jan-11	0.25	0.61	1.99	3.39	4.52	1.38	2.78	3.91	1.40	2.53	1.13
Feb-11	0.25	0.77	2.26	3.58	4.65	1.49	2.80	3.88	1.32	2.39	1.08
Mar-11	0.25	0.70	2.11	3.41	4.51	1.42	2.72	3.82	1.30	2.40	1.10
Apr-11	0.25	0.73	2.17	3.46	4.50	1.43	2.72	3.77	1.29	2.33	1.05
May-11	0.25	0.56	1.84	3.17	4.29	1.29	2.61	3.74	1.33	2.45	1.12
Jun-11	0.25	0.41	1.58	3.00	4.23	1.17	2.59	3.82	1.42	2.65	1.23
Jul-11	0.25	0.41	1.54	3.00	4.27	1.13	2.60	3.86	1.46	2.73	1.27
Aug-11	0.25	0.23	1.02	2.30	3.65	0.79	2.07	3.42	1.28	2.63	1.35
Sep-11	0.25	0.21	0.90	1.98	3.18	0.69	1.76	2.97	1.07	2.28	1.21
Oct-11	0.25	0.28	1.06	2.15	3.13	0.78	1.87	2.85	1.09	2.07	0.98
Nov-11	0.25	0.25	0.91	2.01	3.02	0.65	1.76	2.76	1.11	2.11	1.00
Dec-11	0.25	0.26	0.89	1.98	2.98	0.63	1.72	2.73	1.09	2.09	1.00
Jan-12	0.25	0.24	0.84	1.97	3.03	0.59	1.73	2.79	1.13	2.19	1.06
Feb-12	0.25	0.28	0.83	1.97	3.11	0.55	1.69	2.83	1.14	2.28	1.14
Mar-12	0.25	0.34	1.02	2.17	3.28	0.67	1.83	2.94	1.16	2.26	1.11
Apr-12	0.25	0.29	0.89	2.05	3.18	0.60	1.76	2.89	1.16	2.29	1.13
May-12	0.25	0.29	0.76	1.80	2.93	0.48	1.52	2.65	1.04	2.17	1.13
Jun-12	0.25	0.29	0.71	1.62	2.70	0.42	1.33	2.41	0.91	1.99	1.08
Jul-12	0.25	0.25	0.62	1.53	2.59	0.37	1.28	2.34	0.91	1.97	1.06
Aug-12	0.25	0.27	0.71	1.68	2.77	0.45	1.41	2.50	0.96	2.06	1.09
Sep-12	0.25	0.26	0.67	1.72	2.88	0.41	1.47	2.63	1.05	2.21	1.16
Oct-12	0.25	0.28	0.71	1.75	2.90	0.43	1.47	2.62	1.04	2.19	1.15
Nov-12	0.25	0.27	0.67	1.65	2.80	0.40	1.39	2.54	0.99	2.14	1.15
Dec-12	0.25	0.26	0.70	1.72	2.88	0.44	1.46	2.63	1.02	2.19	1.16
Jan-13	0.25	0.27	0.81	1.91	3.08	0.54	1.65	2.82	1.11	2.28	1.17
Feb-13	0.25	0.27	0.85	1.98	3.17	0.58	1.72	2.90	1.14	2.32	1.18
Mar-13	0.25	0.26	0.82	1.96	3.16	0.56	1.70	2.91	1.14	2.34	1.21
Apr-13	0.25	0.23	0.71	1.76	2.93	0.48	1.53	2.70	1.05	2.22	1.17
May-13	0.25	0.25	0.84	1.93	3.11	0.59	1.68	2.86	1.09	2.27	1.18
Jun-13	0.25	0.33	1.20	2.30	3.40	0.87	1.97	3.07	1.10	2.20	1.10
Jul-13	0.25	0.34	1.40	2.58	3.61	1.06	2.24	3.26	1.18	2.20	1.02
Aug-13	0.25	0.36	1.52	2.74	3.76	1.16	2.38	3.40	1.22	2.24	1.02
Sep-13	0.25	0.40	1.60	2.81	3.79	1.19	2.41	3.38	1.21	2.19	0.98
Oct-13	0.25	0.34	1.37	2.62	3.68	1.03	2.28	3.34	1.25	2.31	1.06
Nov-13	0.25	0.30	1.37	2.72	3.80	1.07	2.41	3.50	1.35	2.43	1.08
Dec-13	0.25	0.34	1.58	2.90	3.89	1.24	2.56	3.55	1.33	2.31	0.99
Jan-14	0.25	0.39	1.65	2.86	3.77	1.25	2.46	3.38	1.21	2.12	0.91
Feb-14	0.25	0.33	1.52	2.71	3.66	1.19	2.38	3.34	1.19	2.15	0.95
Mar-14	0.25	0.40	1.64	2.72	3.62	1.24	2.32	3.22	1.08	1.98	0.90
Apr-14	0.25	0.42	1.70	2.71	3.52	1.28	2.29	3.10	1.00	1.82	0.81
May-14	0.25	0.39	1.59	2.56	3.39	1.20	2.17	3.00	0.97	1.80	0.83
Jun-14	0.25	0.45	1.68	2.60	3.42	1.23	2.15	2.97	0.92	1.74	0.82

**Union Electric Company
Case No. ER-2019-0335**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jul-14	0.25	0.51	1.70	2.54	3.33	1.19	2.04	2.83	0.84	1.63	0.79
Aug-14	0.25	0.47	1.63	2.42	3.20	1.16	1.95	2.73	0.79	1.57	0.78
Sep-14	0.25	0.57	1.77	2.53	3.26	1.21	1.97	2.69	0.76	1.49	0.73
Oct-14	0.25	0.45	1.55	2.30	3.04	1.10	1.86	2.59	0.76	1.49	0.74
Nov-14	0.25	0.53	1.62	2.33	3.04	1.09	1.80	2.51	0.71	1.42	0.71
Dec-14	0.25	0.64	1.64	2.21	2.83	1.00	1.57	2.20	0.57	1.19	0.63
Jan-15	0.25	0.55	1.37	1.88	2.46	0.82	1.33	1.90	0.51	1.08	0.57
Feb-15	0.25	0.62	1.47	1.98	2.57	0.85	1.36	1.95	0.50	1.09	0.59
Mar-15	0.25	0.64	1.52	2.04	2.63	0.88	1.40	1.99	0.52	1.11	0.58
Apr-15	0.25	0.54	1.35	1.94	2.59	0.81	1.40	2.05	0.58	1.23	0.65
May-15	0.25	0.61	1.54	2.20	2.96	0.93	1.59	2.35	0.66	1.42	0.76
Jun-15	0.25	0.69	1.68	2.36	3.11	1.00	1.68	2.42	0.68	1.43	0.75
Jul-15	0.25	0.67	1.63	2.32	3.07	0.96	1.66	2.40	0.69	1.43	0.74
Aug-15	0.25	0.70	1.54	2.17	2.86	0.84	1.47	2.16	0.63	1.31	0.69
Sep-15	0.25	0.71	1.49	2.17	2.95	0.78	1.46	2.24	0.68	1.46	0.78
Oct-15	0.25	0.64	1.39	2.07	2.89	0.74	1.43	2.24	0.68	1.50	0.82
Nov-15	0.25	0.88	1.67	2.26	3.03	0.79	1.38	2.15	0.59	1.36	0.77
Dec-15	0.25	0.98	1.70	2.24	2.97	0.72	1.26	1.99	0.54	1.27	0.73
Jan-16	0.5	0.90	1.52	2.09	2.86	0.62	1.19	1.96	0.57	1.34	0.77
Feb-16	0.5	0.73	1.22	1.78	2.62	0.49	1.05	1.89	0.56	1.40	0.84
Mar-16	0.5	0.88	1.38	1.89	2.68	0.50	1.01	1.81	0.51	1.31	0.80
Apr-16	0.5	0.77	1.26	1.81	2.62	0.49	1.04	1.86	0.55	1.37	0.82
May-16	0.5	0.82	1.30	1.81	2.63	0.48	0.99	1.81	0.51	1.33	0.82
Jun-16	0.5	0.73	1.17	1.64	2.45	0.44	0.91	1.72	0.48	1.29	0.81
Jul-16	0.5	0.67	1.07	1.50	2.23	0.40	0.83	1.55	0.43	1.16	0.72
Aug-16	0.5	0.74	1.13	1.56	2.26	0.40	0.82	1.52	0.42	1.13	0.71
Sep-16	0.5	0.77	1.18	1.63	2.35	0.41	0.86	1.58	0.45	1.17	0.72
Oct-16	0.5	0.84	1.27	1.76	2.50	0.43	0.92	1.66	0.49	1.23	0.74
Nov-16	0.5	0.98	1.60	2.14	2.86	0.62	1.16	1.88	0.55	1.27	0.72
Dec-16	0.5	1.20	1.96	2.49	3.11	0.76	1.30	1.92	0.53	1.15	0.62
Jan-17	0.75	1.21	1.92	2.43	3.02	0.71	1.23	1.81	0.52	1.10	0.59
Feb-17	0.75	1.20	1.90	2.42	3.03	0.70	1.22	1.83	0.52	1.13	0.61
Mar-17	0.75	1.31	2.01	2.48	3.08	0.70	1.17	1.77	0.47	1.07	0.60
Apr-17	1	1.24	1.82	2.30	2.94	0.58	1.06	1.70	0.47	1.12	0.64
May-17	1	1.30	1.84	2.30	2.96	0.54	1.00	1.66	0.47	1.12	0.66
Jun-17	1	1.34	1.77	2.19	2.80	0.43	0.84	1.45	0.41	1.02	0.61
Jul-17	1.25	1.37	1.87	2.32	2.88	0.50	0.95	1.51	0.45	1.01	0.57
Aug-17	1.25	1.34	1.78	2.21	2.80	0.44	0.87	1.46	0.43	1.02	0.59
Sep-17	1.25	1.38	1.80	2.20	2.78	0.41	0.82	1.39	0.40	0.98	0.57
Oct-17	1.25	1.55	1.98	2.36	2.88	0.43	0.81	1.33	0.38	0.90	0.52
Nov-17	1.25	1.70	2.05	2.35	2.80	0.35	0.66	1.11	0.30	0.75	0.45
Dec-17	1.25	1.84	2.18	2.40	2.77	0.34	0.56	0.92	0.22	0.59	0.37
Jan-18	1.5	2.03	2.38	2.58	2.88	0.35	0.55	0.85	0.20	0.50	0.29
Feb-18	1.5	2.18	2.60	2.86	3.13	0.42	0.68	0.96	0.26	0.53	0.27
Mar-18	1.5	2.28	2.63	2.84	3.09	0.35	0.57	0.82	0.21	0.46	0.25
Apr-18		2.38	2.70	2.87	3.07	0.32	0.49	0.69	0.17	0.37	0.20
May-18		2.51	2.82	2.98	3.13	0.31	0.47	0.62	0.16	0.31	0.15
Jun-18		2.53	2.78	2.91	3.05	0.25	0.38	0.52	0.13	0.27	0.14
Jul-18		2.61	2.78	2.89	3.01	0.17	0.28	0.40	0.11	0.23	0.12

Union Electric Company
Case No. ER-2019-0335

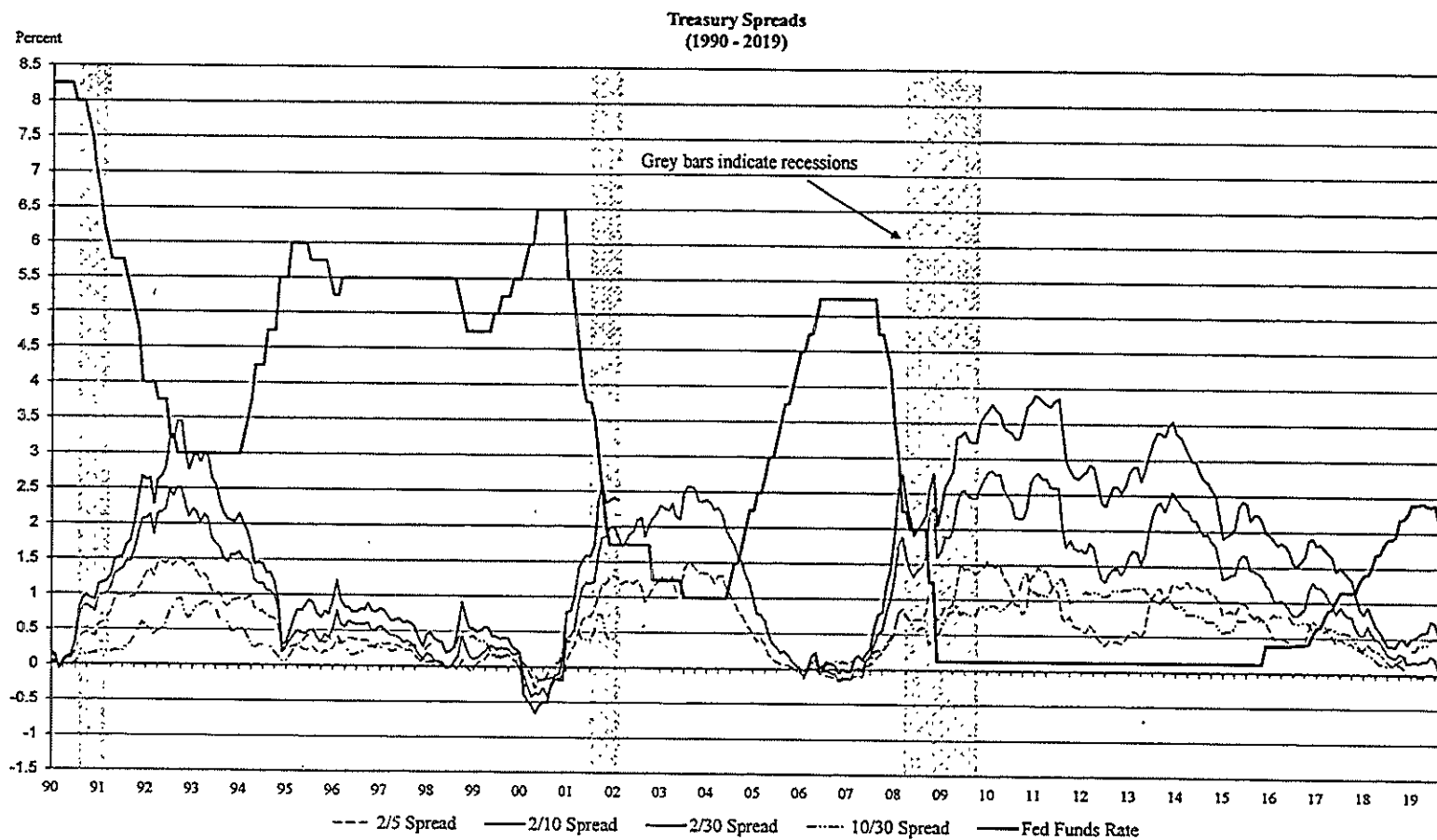
Average Yields of Different Treasury Securities and Average Spreads Between Yields

Note: Shaded Date Ranges Correspond to U.S. Recessions

Underlined Spreads Correspond to Inverted Yield Curves

Date	Rate	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Aug-18		2.64	2.77	2.89	3.04	0.13	0.25	0.40	0.12	0.27	0.15
Sep-18		2.77	2.89	3.00	3.15	0.12	0.23	0.38	0.11	0.26	0.15
Oct-18		2.86	3.00	3.15	3.34	0.14	0.29	0.48	0.15	0.34	0.19
Nov-18		2.86	2.95	3.12	3.36	0.09	0.26	0.50	0.17	0.41	0.24
Dec-18		2.68	2.68	2.83	3.10	0.00	0.15	0.42	0.15	0.42	0.27
Jan-19		2.54	2.54	2.71	3.04	0.00	0.17	0.50	0.17	0.50	0.33
Feb-19		2.50	2.49	2.68	3.02	<u>-0.01</u>	0.18	0.52	0.19	0.53	0.34
Mar-19		2.41	2.37	2.57	2.98	<u>-0.04</u>	0.16	0.57	0.20	0.61	0.41
Apr-19		2.34	2.33	2.53	2.94	<u>-0.01</u>	0.19	0.60	0.20	0.61	0.41
May-19		2.21	2.19	2.40	2.82	<u>-0.02</u>	0.19	0.61	0.21	0.63	0.42
Jun-19		1.81	1.83	2.07	2.57	0.02	0.26	0.76	0.24	0.74	0.50
Jul-19		1.84	1.83	2.06	2.57	<u>-0.01</u>	0.22	0.73	0.23	0.74	0.51
Aug-19		1.57	1.49	1.63	2.12	<u>-0.08</u>	0.06	0.55	0.14	0.63	0.49
Sep-19		1.65	1.57	1.70	2.16	<u>-0.08</u>	0.05	0.51	0.13	0.59	0.46

Source: St. Louis Federal Reserve Bank Constant Maturity Yields Data



Union Electric Company
Case No. ER-2019-0335

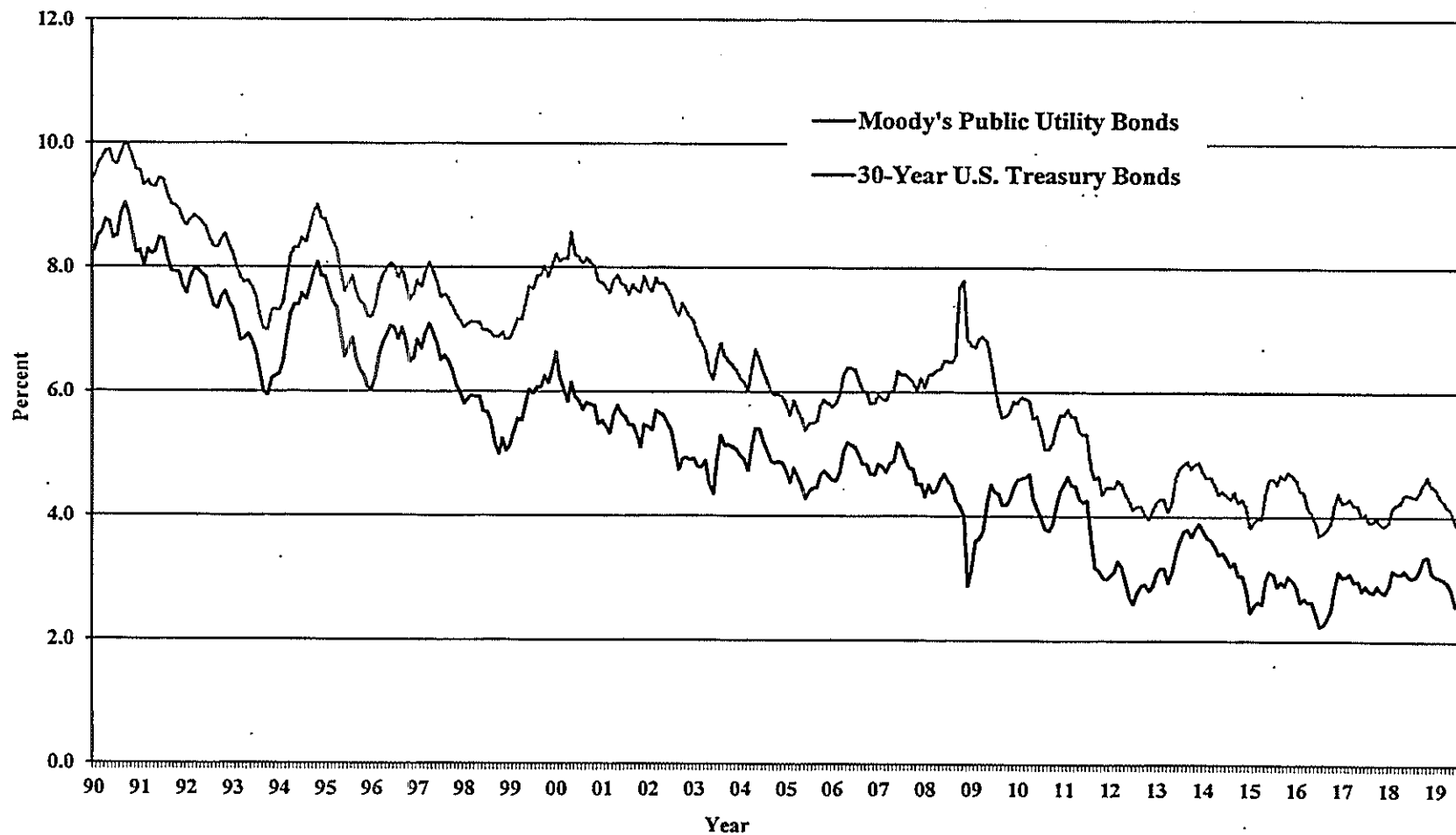
Average Yields on Public Utility Bonds

Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1990	9.44	Jan 1996	7.20	Jan 2002	7.69	Jan 2008	6.08	Jan 2014	4.72
Feb	9.66	Feb	7.37	Feb	7.62	Feb	6.28	Feb	4.64
Mar	9.75	Mar	7.72	Mar	7.83	Mar	6.29	Mar	4.63
Apr	9.87	Apr	7.88	Apr	7.74	Apr	6.36	Apr	4.52
May	9.89	May	7.99	May	7.76	May	6.38	May	4.37
Jun	9.69	Jun	8.07	Jun	7.67	Jun	6.50	Jun	4.42
Jul	9.66	Jul	8.02	Jul	7.54	Jul	6.50	Jul	4.35
Aug	9.84	Aug	7.84	Aug	7.34	Aug	6.48	Aug	4.29
Sep	10.01	Sep	8.01	Sep	7.23	Sep	6.59	Sep	4.40
Oct	9.94	Oct	7.76	Oct	7.43	Oct	7.70	Oct	4.24
Nov	9.76	Nov	7.48	Nov	7.31	Nov	7.80	Nov	4.29
Dec	9.57	Dec	7.58	Dec	7.20	Dec	6.87	Dec	4.18
Jan 1991	9.56	Jan 1997	7.79	Jan 2003	7.13	Jan 2009	6.77	Jan 2015	3.83
Feb	9.31	Feb	7.68	Feb	6.92	Feb	6.72	Feb	3.91
Mar	9.39	Mar	7.92	Mar	6.80	Mar	6.85	Mar	3.97
Apr	9.30	Apr	8.08	Apr	6.68	Apr	6.90	Apr	3.96
May	9.29	May	7.94	May	6.35	May	6.83	May	4.38
Jun	9.44	Jun	7.77	Jun	6.21	Jun	6.54	Jun	4.60
Jul	9.40	Jul	7.52	Jul	6.54	Jul	6.15	Jul	4.63
Aug	9.16	Aug	7.57	Aug	6.78	Aug	5.80	Aug	4.54
Sep	9.03	Sep	7.50	Sep	6.58	Sep	5.60	Sep	4.68
Oct	8.99	Oct	7.37	Oct	6.50	Oct	5.64	Oct	4.63
Nov	8.93	Nov	7.24	Nov	6.44	Nov	5.71	Nov	4.73
Dec	8.76	Dec	7.16	Dec	6.36	Dec	5.86	Dec	4.69
Jan 1992	8.67	Jan 1998	7.03	Jan 2004	6.23	Jan 2010	5.83	Jan 2016	4.62
Feb	8.77	Feb	7.09	Feb	6.17	Feb	5.94	Feb	4.44
Mar	8.84	Mar	7.13	Mar	6.01	Mar	5.90	Mar	4.40
Apr	8.79	Apr	7.12	Apr	6.38	Apr	5.87	Apr	4.16
May	8.72	May	7.11	May	6.68	May	5.59	May	4.06
Jun	8.64	Jun	6.99	Jun	6.53	Jun	5.62	Jun	3.93
Jul	8.46	Jul	6.99	Jul	6.34	Jul	5.41	Jul	3.70
Aug	8.34	Aug	6.96	Aug	6.18	Aug	5.10	Aug	3.73
Sep	8.32	Sep	6.88	Sep	6.01	Sep	5.10	Sep	3.80
Oct	8.44	Oct	6.88	Oct	5.95	Oct	5.20	Oct	3.90
Nov	8.53	Nov	6.96	Nov	5.97	Nov	5.45	Nov	4.21
Dec	8.36	Dec	6.84	Dec	5.93	Dec	5.61	Dec	4.39
Jan 1993	8.23	Jan 1999	6.87	Jan 2005	5.80	Jan 2011	5.69	Jan 2017	4.24
Feb	8.00	Feb	7.00	Feb	5.64	Feb	5.82	Feb	4.25
Mar	7.85	Mar	7.18	Mar	5.86	Mar	5.74	Mar	4.30
Apr	7.76	Apr	7.16	Apr	5.72	Apr	5.76	Apr	4.19
May	7.78	May	7.42	May	5.60	May	5.57	May	4.19
Jun	7.68	Jun	7.70	Jun	5.39	Jun	5.52	Jun	4.01
Jul	7.53	Jul	7.66	Jul	5.50	Jul	5.61	Jul	4.06
Aug	7.21	Aug	7.86	Aug	5.51	Aug	5.26	Aug	3.92
Sep	7.01	Sep	7.87	Sep	5.34	Sep	5.01	Sep	3.93
Oct	6.99	Oct	8.02	Oct	5.79	Oct	5.11	Oct	3.97
Nov	7.30	Nov	7.86	Nov	5.88	Nov	5.00	Nov	3.92
Dec	7.33	Dec	8.04	Dec	5.83	Dec	4.96	Dec	3.93
Jan 1994	7.31	Jan 2000	8.22	Jan 2006	5.77	Jan 2012	4.97	Jan 2018	3.97
Feb	7.44	Feb	8.10	Feb	5.83	Feb	4.99	Feb	3.88
Mar	7.83	Mar	8.14	Mar	5.98	Mar	5.13	Mar	3.85
Apr	8.20	Apr	8.14	Apr	6.28	Apr	5.05	April	4.24
May	8.32	May	8.55	May	6.39	May	4.84	May	4.36
Jun	8.31	Jun	8.22	Jun	6.39	Jun	4.67	Jun	4.37
Jul	8.47	Jul	8.17	Jul	6.37	Jul	4.56	Jul	4.35
Aug	8.41	Aug	8.05	Aug	6.20	Aug	4.71	August	4.33
Sep	8.65	Sep	8.16	Sep	6.03	Sep	4.75	Sep	4.41
Oct	8.88	Oct	8.08	Oct	6.01	Oct	4.69	Oct	4.56
Nov	9.00	Nov	8.03	Nov	5.82	Nov	4.53	Nov	4.65
Dec	8.79	Dec	7.79	Dec	5.83	Dec	4.28	Dec	4.51
Jan 1995	8.77	Jan 2001	7.76	Jan 2007	5.96	Jan 2013	4.45	Jan 2019	4.48
Feb	8.56	Feb	7.69	Feb	5.91	Feb	4.49	Feb	4.35
Mar	8.41	Mar	7.59	Mar	5.87	Mar	4.45	Mar	4.26
Apr	8.30	Apr	7.81	Apr	6.01	Apr	4.19	April	4.18
May	7.93	May	7.88	May	6.03	May	4.36	May	4.10
Jun	7.62	Jun	7.75	Jun	6.34	Jun	4.70	Jun	3.93
Jul	7.73	Jul	7.71	Jul	6.28	Jul	4.90	Jul	3.79
Aug	7.86	Aug	7.57	Aug	6.28	Aug	5.00	August	3.70
Sep	7.62	Sep	7.73	Sep	6.24	Sep	5.05	Sep	3.65
Oct	7.46	Oct	7.64	Oct	6.17	Oct	4.94		
Nov	7.40	Nov	7.61	Nov	6.04	Nov	5.04		
Dec	7.21	Dec	7.86	Dec	6.23	Dec	4.89		

Source:
Mergent Bond Record (through November 2010), BondsOnline (December 2010 - November 2013), Mergent Bond Record (December 2013 - Present)

Union Electric Company
Case No. ER-2019-0335

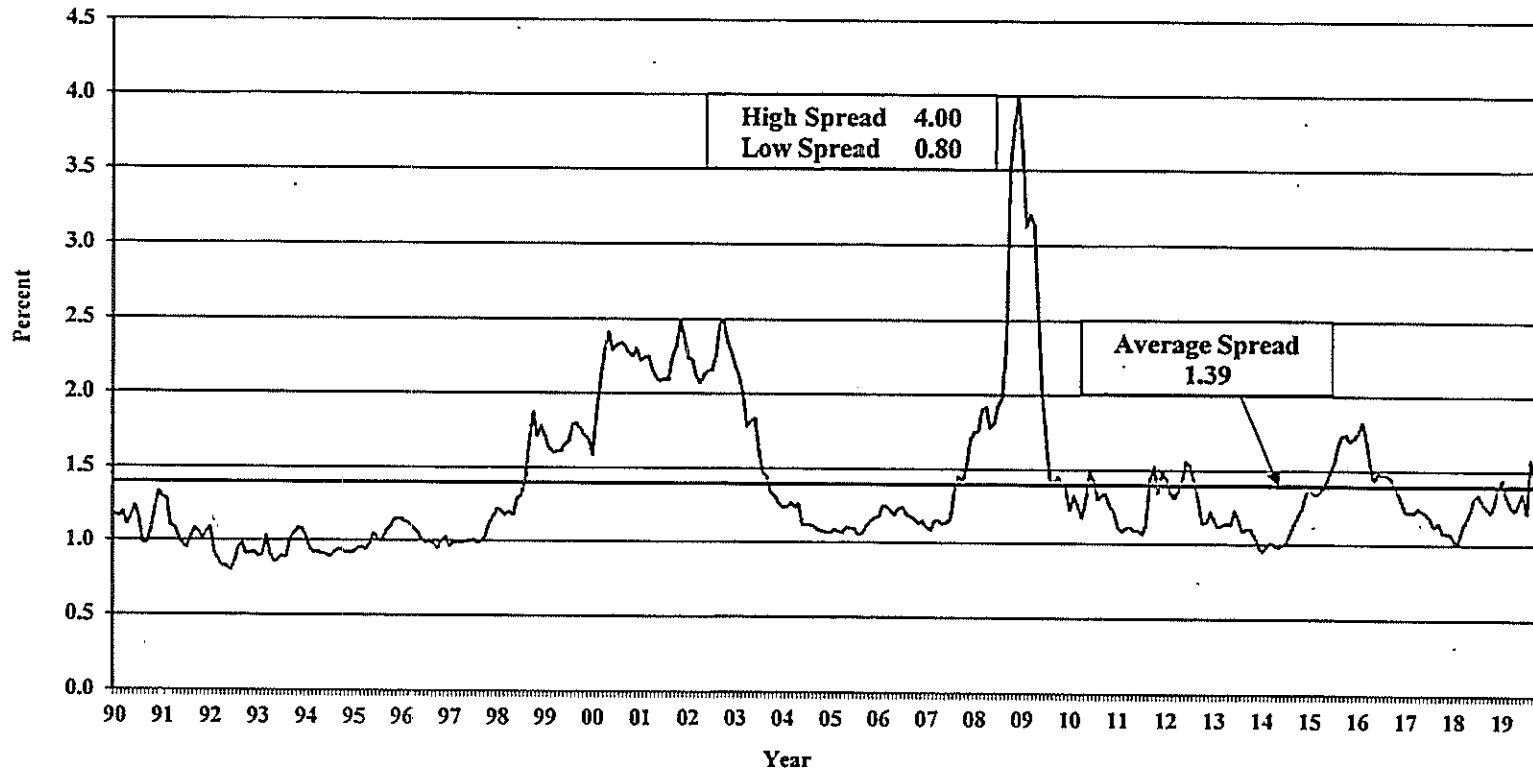
Average Yields on Public Utility Bonds and
30-Year U.S. Treasury Bonds (1990 - 2019)



Case No. ER-2019-0335
Union Electric Company

Union Electric Company
Case No. ER-2019-0335

Average Spreads Between Yields on Public Utility Bonds and
30-Year U.S. Treasury Bonds (1990 - 2019)



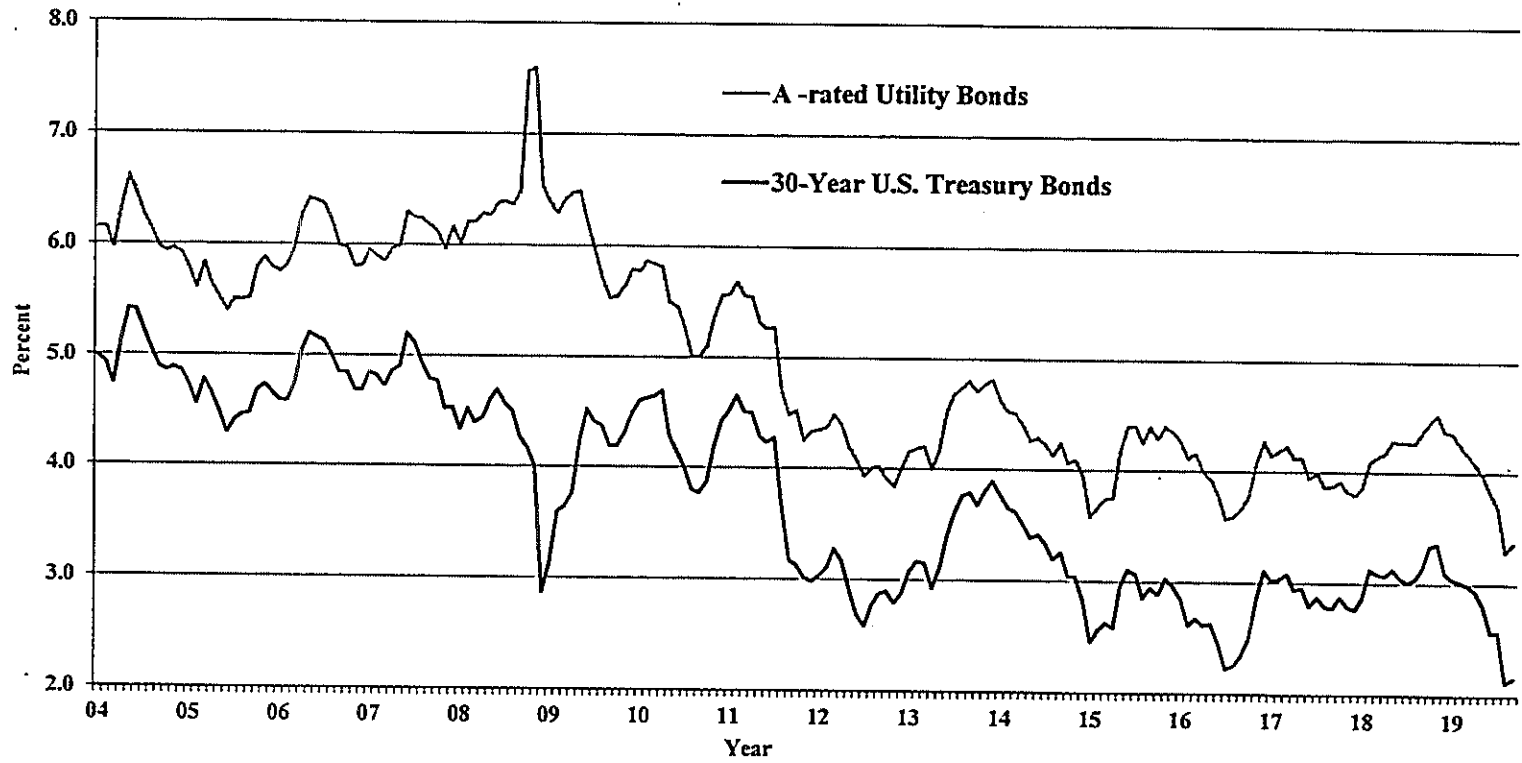
**Union Electric Company
Case No. ER-2019-0335**

Average Yields on A rated Public Utility Bonds

Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 2004	6.15	Jan 2008	6.02	Jan 2012	4.34	Jan 2016	4.27
Feb	6.15	Feb	6.21	Feb	4.36	Feb	4.11
Mar	5.97	Mar	6.21	Mar	4.48	Mar	4.16
Apr	6.35	Apr	6.29	Apr	4.40	Apr	4.00
May	6.62	May	6.27	May	4.20	May	3.93
Jun	6.46	Jun	6.38	Jun	4.08	Jun	3.78
Jul	6.27	Jul	6.40	Jul	3.93	Jul	3.57
Aug	6.14	Aug	6.37	Aug	4.00	Aug	3.59
Sep	5.98	Sep	6.49	Sep	4.02	Sep	3.66
Oct	5.94	Oct	7.56	Oct	3.91	Oct	3.77
Nov	5.97	Nov	7.60	Nov	3.84	Nov	4.08
Dec	5.92	Dec	6.54	Dec	4.00	Dec	4.27
Jan 2005	5.78	Jan 2009	6.39	Jan 2013	4.15	Jan 2017	4.14
Feb	5.61	Feb	6.30	Feb	4.18	Feb	4.18
Mar	5.83	Mar	6.42	Mar	4.20	Mar	4.23
Apr	5.64	Apr	6.48	Apr	4.00	Apr	4.12
May	5.53	May	6.49	May	4.17	May	4.12
Jun	5.40	Jun	6.20	Jun	4.53	Jun	3.94
Jul	5.51	Jul	5.97	Jul	4.68	Jul	3.99
Aug	5.50	Aug	5.71	Aug	4.73	Aug	3.86
Sep	5.52	Sep	5.53	Sep	4.80	Sep	3.87
Oct	5.79	Oct	5.55	Oct	4.70	Oct	3.91
Nov	5.88	Nov	5.64	Nov	4.77	Nov	3.83
Dec	5.80	Dec	5.79	Dec	4.81	Dec	3.79
Jan 2006	5.75	Jan 2010	5.77	Jan 2014	4.63	Jan 2018	3.86
Feb	5.82	Feb	5.87	Feb	4.53	Feb	4.09
Mar	5.98	Mar	5.84	Mar	4.51	Mar	4.13
Apr	6.29	Apr	5.81	Apr	4.41	Apr	4.17
May	6.42	May	5.50	May	4.26	May	4.28
Jun	6.40	Jun	5.46	Jun	4.29	Jun	4.27
Jul	6.37	Jul	5.26	Jul	4.23	Jul	4.27
Aug	6.20	Aug	5.01	Aug	4.13	Aug	4.26
Sep	6.00	Sep	5.01	Sep	4.24	Sep	4.36
Oct	5.98	Oct	5.10	Oct	4.06	Oct	4.45
Nov	5.80	Nov	5.37	Nov	4.09	Nov	4.52
Dec	5.81	Dec	5.56	Dec	3.95	Dec	4.37
Jan 2007	5.96	Jan 2011	5.57	Jan 2015	3.58	Jan 2019	4.35
Feb	5.90	Feb	5.68	Feb	3.67	Feb	4.25
Mar	5.85	Mar	5.56	Mar	3.74	Mar	4.16
Apr	5.97	Apr	5.55	Apr	3.75	April	4.08
May	5.99	May	5.32	May	4.17	May	3.98
Jun	6.30	Jun	5.26	Jun	4.39	Jun	3.82
Jul	6.25	Jul	5.27	Jul	4.40	July	3.69
Aug	6.24	Aug	4.69	Aug	4.25	Aug	3.29
Sep	6.18	Sep	4.48	Sep	4.39	Sep	3.37
Oct	6.11	Oct	4.52	Oct	4.29		
Nov	5.97	Nov	4.25	Nov	4.40		
Dec	6.16	Dec	4.33	Dec	4.35		

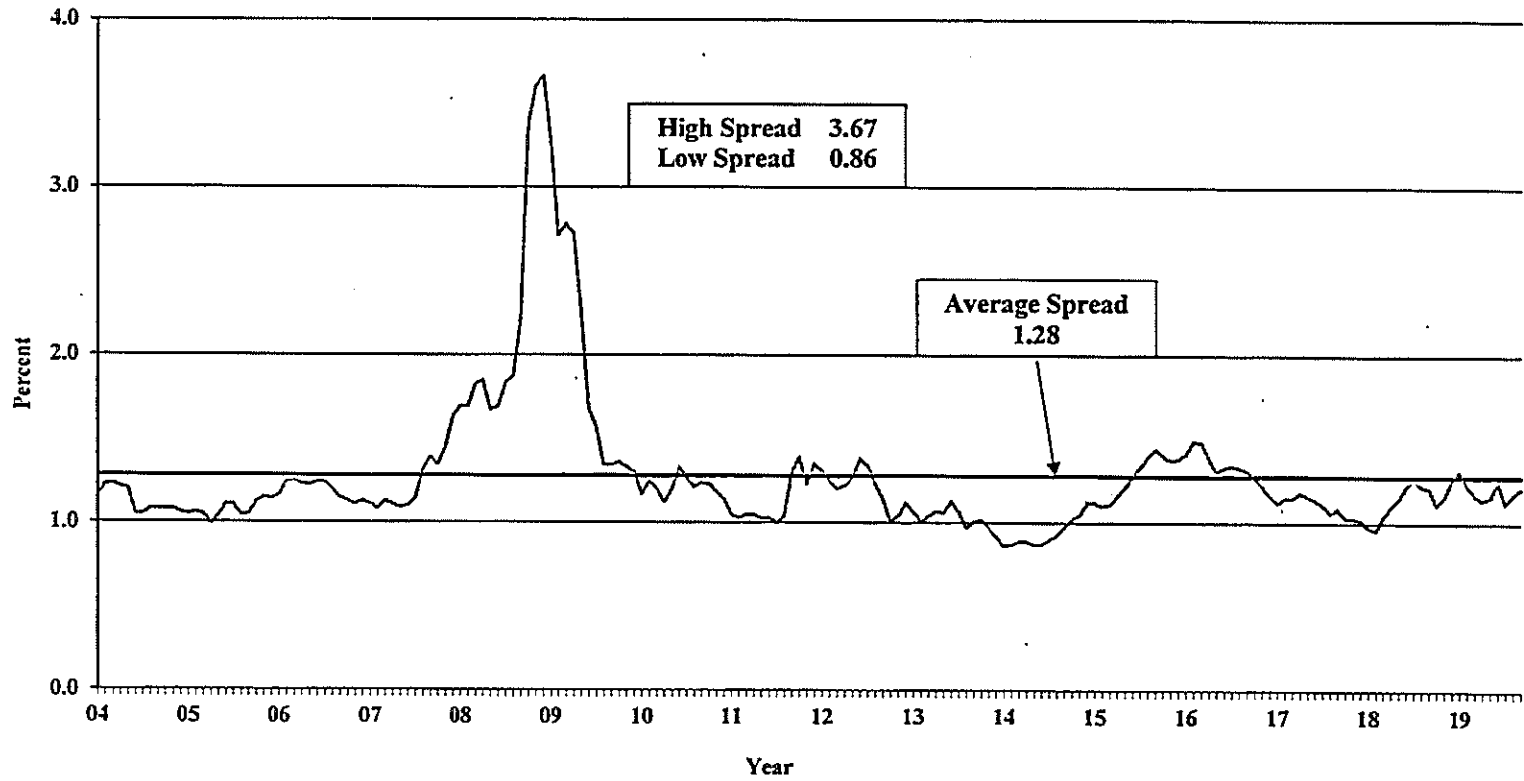
Source: Mergent Bond Record (through November 2010); BondsOnline (December 2010 - November 2013);
Mergent Bond Record (December 2013 - Present).

Average Yields on A-rated Utility Bonds and 30-Year U.S. Treasury Bonds
From (2004 - 2019)



Union Electric Company
Case No. ER-2019-0335

Average Spreads Between Yields on A-rated Public Utility Bonds
and 30-Year U.S. Treasury Bonds (2004 - 2019)



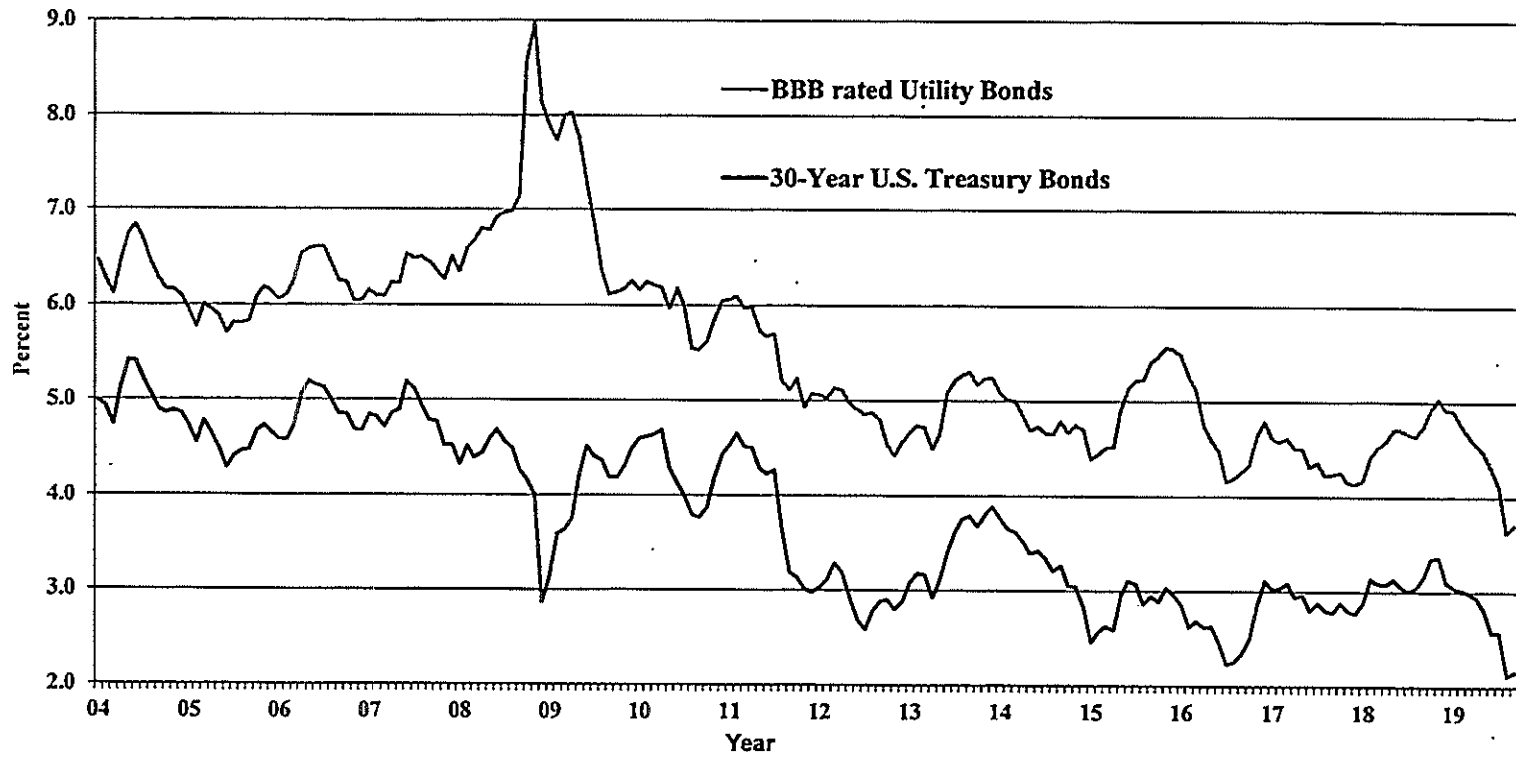
**Union Electric Company
Case No. ER-2019-0335**

Average Yields on BBB rated Public Utility Bonds

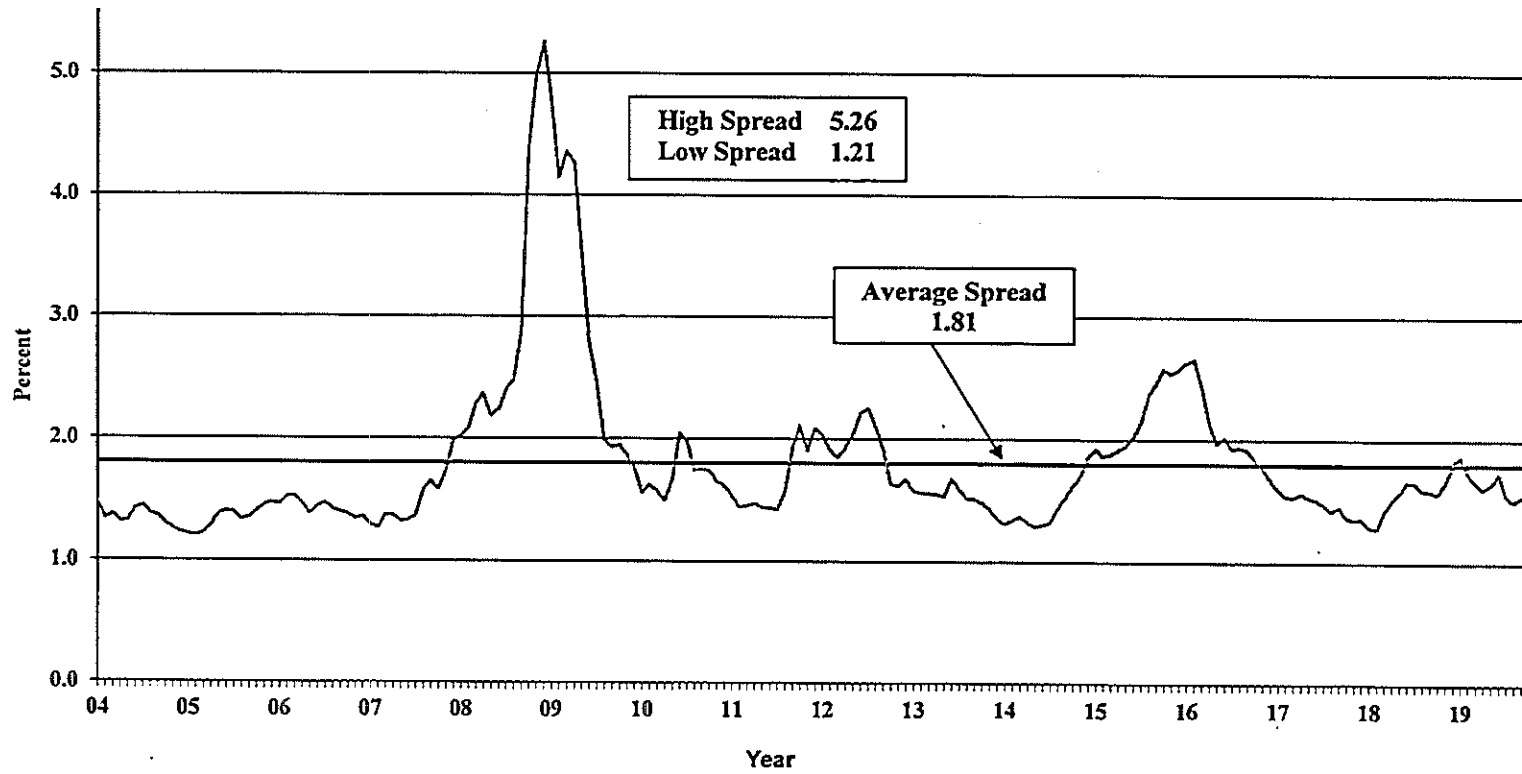
Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 2004	6.47	Jan 2008	6.35	Jan 2012	5.06	Jan 2016	5.49
Feb	6.28	Feb	6.60	Feb	5.02	Feb	5.28
Mar	6.12	Mar	6.68	Mar	5.13	Mar	5.12
Apr	6.46	Apr	6.81	Apr	5.11	Apr	4.75
May	6.75	May	6.79	May	4.97	May	4.60
Jun	6.84	Jun	6.93	Jun	4.91	Jun	4.47
Jul	6.67	Jul	6.97	Jul	4.85	Jul	4.16
Aug	6.45	Aug	6.98	Aug	4.88	Aug	4.20
Sep	6.27	Sep	7.15	Sep	4.81	Sep	4.27
Oct	6.17	Oct	8.58	Oct	4.54	Oct	4.34
Nov	6.16	Nov	8.98	Nov	4.42	Nov	4.64
Dec	6.10	Dec	8.13	Dec	4.56	Dec	4.79
Jan 2005	5.95	Jan 2009	7.90	Jan 2013	4.66	Jan 2017	4.62
Feb	5.76	Feb	7.74	Feb	4.74	Feb	4.58
Mar	6.01	Mar	8.00	Mar	4.72	Mar	4.62
Apr	5.95	Apr	8.03	Apr	4.49	Apr	4.51
May	5.88	May	7.76	May	4.65	May	4.50
Jun	5.70	Jun	7.30	Jun	5.08	Jun	4.32
Jul	5.81	Jul	6.87	Jul	5.21	Jul	4.36
Aug	5.80	Aug	6.36	Aug	5.28	Aug	4.23
Sep	5.83	Sep	6.12	Sep	5.31	Sep	4.24
Oct	6.08	Oct	6.14	Oct	5.17	Oct	4.26
Nov	6.19	Nov	6.18	Nov	5.24	Nov	4.16
Dec	6.14	Dec	6.26	Dec	5.25	Dec	4.14
Jan 2006	6.06	Jan 2010	6.16	Jan 2014	5.09	Jan 2018	4.18
Feb	6.11	Feb	6.25	Feb	5.01	Feb	4.42
Mar	6.26	Mar	6.22	Mar	5.00	Mar	4.52
Apr	6.54	Apr	6.19	Apr	4.85	Apr	4.58
May	6.59	May	5.97	May	4.69	May	4.71
Jun	6.61	Jun	6.18	Jun	4.73	Jun	4.71
Jul	6.61	Jul	5.98	Jul	4.66	Jul	4.67
Aug	6.43	Aug	5.55	Aug	4.65	Aug	4.64
Sep	6.26	Sep	5.53	Sep	4.79	Sep	4.74
Oct	6.24	Oct	5.62	Oct	4.67	Oct	4.91
Nov	6.04	Nov	5.85	Nov	4.75	Nov	5.03
Dec	6.05	Dec	6.04	Dec	4.70	Dec	4.92
Jan 2007	6.16	Jan 2011	6.06	Jan 2015	4.39	Jan 2019	4.91
Feb	6.10	Feb	6.10	Feb	4.44	Feb	4.76
Mar	6.10	Mar	5.97	Mar	4.51	Mar	4.65
Apr	6.24	Apr	5.98	Apr	4.51	April	4.55
May	6.23	May	5.74	May	4.91	May	4.47
Jun	6.54	Jun	5.67	Jun	5.13	Jun	4.31
Jul	6.49	Jul	5.70	Jul	5.22	Jul	4.13
Aug	6.51	Aug	5.22	Aug	5.23	Aug	3.63
Sep	6.45	Sep	5.11	Sep	5.42	Sep	3.71
Oct	6.36	Oct	5.24	Oct	5.47		
Nov	6.27	Nov	4.93	Nov	5.57		
Dec	6.51	Dec	5.07	Dec	5.55		

Source: Mergent Bond Record (through November 2010); BondsOnline (December 2010 - November 2013);
Mergent Bond Record (December 2013 - Present).

Average Yields on BBB rated Utility Bonds and 30-Year U.S. Treasury Bonds
From (2004 - 2019)



Average Spreads Between Yields on BBB rated Public Utility Bonds
and 30-Year U.S. Treasury Bonds (2004 - 2019)



Union Electric Company
Case No. ER-2019-0335

Criteria for Selecting Comparable Electric Utility Companies

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(12)	
	Ticker	Stock Publicly Traded	80% of Assets U.S. Regulated (EEI)	At Least Investment Grade Credit Rating (2 of 3 agencies)	L-T Growth Coverage from at least 2 equity analysts and L-T Growth Available	No Pending Merger or Acquisition	No Reduced Dividend Since 2016	At Least 80% of Income from U.S. Regulated Utility Operations	At least 50% of Plant from Electric Utility	At least 25% of Plant Electric Plant Generation	Comparable Company Met All Criteria
Edison Electric Institute Power Companies	ALLETE, Inc.	YES	NO								
Alliant Energy Corporation	LNT	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Ameren Corporation ¹	AEE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
American Electric Power Company, Inc.	AEP	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
AVANGRID, Inc.	AGR	YES	NO								
Avista Corporation	AVA	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Black Hills Corporation	BKH	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CenterPoint Energy, Inc.	CNP	YES	NO						NO		
CMS Energy Corporation	CMS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Consolidated Edison, Inc.	ED	YES	YES	YES	YES	YES	YES	YES	YES	NO	
Dominion Resources, Inc.	D	YES	NO						YES	NO	
DTE Energy Company	DTE	YES	NO								
Duke Energy Corporation	DUK	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Edison International	EIX	YES	YES	YES	YES	YES	YES	YES	YES	NO	
El Paso Electric Company	EE	YES	YES	YES	YES	NO	YES	YES	YES	NO	
Entergy Corporation ²	ETR	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Energy, Inc.	EVRG	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Eversource Energy	ES	YES	YES	YES	YES	YES	YES	YES	YES	NO	
Exelon Corporation	EXC	YES	NO						YES	NO	
FirstEnergy Corp.	FE	YES	YES	YES	YES	YES	YES	YES	YES	NO	
Hawaiian Electric Industries, Inc.	HE	YES	NO						YES	NO	
IDACORP, Inc.	IDA	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
MDU Resources Group, Inc.	MDU	YES	NO								
MGE Energy, Inc.	MGE	YES	NO								
NextEra Energy, Inc.	NEE	YES	NO								
NiSource Inc.	NI	YES	YES	YES	YES	YES	YES	YES	NO		
NorthWestern Corporation	NWE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
OGE Energy Corp.	OGE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Tail Corporation	OTTR	YES	YES	YES	NO						
PG&E Corporation	PCG	YES	YES	NO							
Pinnacle West Capital Corporation	PNW	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
PNM Resources, Inc.	PNM	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Portland General Electric Company	POR	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
PPL Corporation	PPL	YES	YES	YES	YES	YES	YES	NO			
Public Service Enterprise Group Inc.	PEG	YES	NO								
SCANA Corporation	SCG	YES	YES	YES	NO						
Sempra Energy	SRE	YES	NO								
Southern Company	SO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Until Corporation	UTL	YES	YES	YES	YES	YES	YES	YES	NO		
Vectra Corporation	VVC	YES	YES	NO							
WEC Energy Group, Inc.	WEC	YES	YES	YES	YES	YES	NO				
Xcel Energy, Inc.	XEL	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Sources: Columns 1, 2, 3, 4 = Edison Electric Institute
Column 5, 6, 7, 8, 9, 10, 11 = SNL Finance

Notes: 1 Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

2 Entergy Corporation was not included because losses from its wholesale commodities business have led to considerable volatility in revenues, compared to the proxy group.

**Union Electric Company
Case No. ER-2019-0335**

**Comparable Electric Utility Companies
for Union Electric Company**

Number	Ticker Symbol	Company Name	S&P Corporate Credit Rating
1	LNT	Alliant Energy Corporation	A-
2	AEE	Ameren Corporation	BBB+
3	AEP	American Electric Power Company, Inc.	A-
4	AVA	Avista Corporation	BBB
5	CMS	CMS Energy Corporation	BBB+
6	DUK	Duke Energy Corporation	A-
8	EVRG	Evergy, Inc.	A-
9	IDA	IDACORP, Inc.	BBB
10	NWE	NorthWestern Corporation	BBB
11	OGE	OGE Energy Corp.	BBB+
12	PNW	Pinnacle West Capital Corporation	A-
13	PNM	PNM Resources, Inc.	BBB+
14	POR	Portland General Electric Company	BBB+
15	SO	Southern Company	A-
16	XEL	Xcel Energy, Inc.	A-
Average			BBB+

Note: Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
Case No. ER-2019-0335

Spire Missouri Gas Proxy Group
Credit Ratings

Number	Ticker Symbol	Company Name	S&P Corporate Credit Rating
1	ATO	Atmos Energy Corporation	A
2	NWN	Northwest Natural Holding Company	A+
3	OGS	One Gas, Inc.	A
4	SWX	Southwest Gas Holdings, Inc.	BBB+
5	SR	Spire, Inc.	A-
		Average	<u>A</u>

Union Electric Company
Case No. ER-2019-0335

Historical Capital Structures Including Current Portions of Long-Term Debt - Goodwill:

Ameren
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 5,762	\$ 5,887	\$ 5,768	\$ 5,935	\$ 7,005	\$ 7,006	\$ 7,665	\$ 8,169
Preferred Stock	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142	\$ 142
Equity ²	\$ 7,508	\$ 6,205	\$ 6,133	\$ 6,302	\$ 6,535	\$ 6,692	\$ 6,773	\$ 7,220
Total	\$ 13,412	\$ 12,234	\$ 12,043	\$ 12,379	\$ 13,682	\$ 13,840	\$ 14,580	\$ 15,531

ATXI
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	0	\$ 37	\$ 51	\$ 100	\$ 290	\$ 350	\$ 525	\$ 525
Preferred Stock	NA	NA	NA	NA	NA	NA	NA	NA
Equity ²	\$ 28	\$ 32	\$ 63	\$ 124	\$ 343	\$ 477	\$ 658	\$ 660
Total	\$ 28	\$ 69	\$ 114	\$ 224	\$ 633	\$ 827	\$ 1,183	\$ 1,185

Ameren Illinois
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 1,658	\$ 1,727	\$ 1,856	\$ 2,224	\$ 2,471	\$ 2,588	\$ 2,830	\$ 3,296
Preferred Stock	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62
Equity ²	\$ 1,979	\$ 1,928	\$ 1,975	\$ 2,188	\$ 2,424	\$ 2,561	\$ 2,837	\$ 3,301
Total	\$ 3,699	\$ 3,717	\$ 3,893	\$ 4,474	\$ 4,957	\$ 5,211	\$ 5,729	\$ 6,659

Ameren Missouri
(Dollars in thousands)

Capital Components	2011	2012	2013	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 3,680	\$ 3,736	\$ 3,487	\$ 3,711	\$ 3,840	\$ 3,724	\$ 3,691	\$ 3,728
Preferred Stock	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80
Equity ²	\$ 3,957	\$ 3,974	\$ 3,913	\$ 3,972	\$ 4,002	\$ 4,010	\$ 4,001	\$ 4,149
Total	\$ 7,717	\$ 7,790	\$ 7,480	\$ 7,763	\$ 7,922	\$ 7,814	\$ 7,772	\$ 7,957

Notes: 1. Includes current maturities on long-term debt.
2. Minus goodwill.

Source: Market Intelligence

Union Electric Company
Case No. ER-2019-0335

Historical Capital Structures Including Current Portion of Long-Term Debt - Goodwill

Ameren									
<i>(in percentages)</i>									
Capital Components	2011	2012	2013	2014	2015	2016	2017	2018	8 Year Average
Long-Term Debt ¹	42.96%	48.12%	47.90%	47.94%	51.20%	50.62%	52.57%	52.60%	49.24%
Preferred Stock	1.06%	1.16%	1.18%	1.15%	1.04%	1.03%	0.97%	0.91%	1.06%
Equity ²	55.98%	50.72%	50.93%	50.91%	47.76%	48.35%	46.45%	46.49%	49.70%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

ATXI									
<i>(in percentages)</i>									
Capital Components	2011	2012	2013	2014	2015	2016	2017	2018	8 Year Average
Long-Term Debt ¹	0.00%	53.62%	44.74%	44.72%	45.78%	42.33%	44.38%	44.30%	44.30%
Preferred Stock	NA	NA	NA	NA	NA	NA	NA	NA	NA
Equity ²	100.00%	46.38%	55.26%	55.28%	54.22%	57.67%	55.62%	55.70%	55.70%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Ameren Illinois									
<i>(in percentages)</i>									
Capital Components	2011	2012	2013	2014	2015	2016	2017	2018	8 Year Average
Long-Term Debt ¹	44.82%	46.46%	47.68%	49.71%	49.85%	49.66%	49.40%	49.50%	49.62%
Preferred Stock	1.68%	1.67%	1.59%	1.39%	1.25%	1.19%	1.08%	0.93%	1.17%
Equity ²	53.50%	51.87%	50.73%	48.90%	48.90%	49.15%	49.52%	49.57%	49.21%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Ameren Missouri									
<i>(in percentages)</i>									
Capital Components	2011	2012	2013	2014	2015	2016	2017	2018	8 Year Average
Long-Term Debt ¹	47.69%	47.96%	46.62%	47.80%	48.47%	47.66%	47.49%	46.85%	47.66%
Preferred Stock	1.04%	1.03%	1.07%	1.03%	1.01%	1.02%	1.03%	1.01%	1.02%
Equity ²	51.28%	51.01%	52.31%	51.17%	50.52%	51.32%	51.48%	52.14%	51.32%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Notes: 1. Includes current maturities on long-term debt.
2. Minus goodwill.

Sources: Ameren's SEC 10-K for 2014, 2015, 2016, 2017, & 2018

Union Electric Company
Case No. ER-2019-0335

Staff Recommended Capital Structure for Ameren Missouri as of June 30, 2019

<u>Capital Component</u>	<u>Percentage of Capital</u>
Long-Term Debt	49.02%
Preferred Stock	0.98%
<u>Common Equity ²</u>	<u>50.00%</u>
Total Capitalization	100.00%

% Capital Structure for Ameren as of June 30, 2019 ¹

<u>Capital Component</u>	<u>Percentage of Capital</u>
Long-Term Debt	52.53%
Preferred Stock	0.90%
<u>Common Equity</u>	<u>46.58%</u>
Total Capitalization	100.00%

% Capital Structure for ATXI as of June 30, 2019 ¹

<u>Capital Component</u>	<u>Percentage of Capital</u>
Long-Term Debt	43.37%
Preferred Stock	NA
<u>Common Equity</u>	<u>56.63%</u>
Total Capitalization	100.00%

% Capital Structure for Ameren Illinois as of June 30, 2019 ¹

<u>Capital Component</u>	<u>Percentage of Capital</u>
Long-Term Debt	48.18%
Preferred Stock	0.91%
<u>Common Equity</u>	<u>50.91%</u>
Total Capitalization	100.00%

% Capital Structure for Ameren Missouri as of June 30, 2019 ¹

<u>Capital Component</u>	<u>Percentage of Capital</u>
Long-Term Debt	47.57%
Preferred Stock	0.98%
<u>Common Equity ²</u>	<u>51.45%</u>
Total Capitalization	100.00%

Source: 1. Market Intelligence

Notes: 2. Reduces common equity to Staff's recommended equity ratio, the reasonable level agreed to by Ameren and the Illinois Commerce Commission for Ameren's Illinois operations.

**Union Electric Company
Case No. ER-2019-0335**

Embedded Cost of Long-Term Debt as of June 30, 2019 for

Ameren

Total Annual Cost:	\$357,759,670
Total Carrying Value:	\$8,179,601,785
Embedded Cost = Total Annual Cost/Total Carrying Value	4.37%

ATXI

Total Annual Cost:	\$357,759,670
Total Carrying Value:	\$8,179,601,785
Embedded Cost = Total Annual Cost/Total Carrying Value	3.56%

Ameren Illinois

Total Annual Cost:	\$135,243,843
Total Carrying Value:	\$3,279,235,529
Embedded Cost = Total Annual Cost/Total Carrying Value	4.45%

Ameren Missouri

Total Annual Cost:	\$180,614,476
Total Carrying Value:	\$3,811,196,134
Embedded Cost = Total Annual Cost/Total Carrying Value	4.60%

Sources: Company response to Staff Data Request No. 0381

**Union Electric Company
Case No. ER-2019-00335**

**Ten-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Comparable Electric Utility Companies**

Company Name	10-Year Annual Compound Growth Rates			Average of Growth Rates
	DPS	EPS	BVPS	
Alliant Energy Corporation	7.05%	2.38%	4.13%	4.52%
Ameren Corporation ¹	-3.49%	-0.39%	-0.74%	-1.54%
American Electric Power Company, Inc.	4.30%	0.28%	3.98%	2.85%
Avista Corporation	8.75%	5.37%	4.09%	6.07%
CMS Energy Corporation	21.73%	NM	4.62%	13.17%
Duke Energy Corporation	1.47%	2.29%	0.97%	1.57%
Evergy, Inc.	NA	NA	NA	NA
IDACORP; Inc.	6.44%	7.11%	5.30%	6.28%
NorthWestern Corporation	5.08%	9.56%	5.67%	6.77%
OGE Energy Corp.	6.42%	6.12%	7.25%	6.60%
Pinnacle West Capital Corporation	2.70%	4.78%	2.63%	3.37%
PNM Resources, Inc.	2.17%	NM	0.03%	1.10%
Portland General Electric Company	4.57%	3.19%	2.73%	3.50%
Southern Company	3.72%	-1.75%	4.15%	2.04%
Xcel Energy, Inc.	4.67%	5.05%	4.38%	4.70%
Average	6.08%	4.03%	3.84%	4.81%

NA = Not Available

Source: Market Intelligence

Notes: ¹ Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
Case No. ER-2019-0335

Five-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Comparable Electric Utility Companies

Company Name	5-Year Annual Compound Growth Rates				Average of Growth Rates
	DPS	EPS	BVPS		
Alliant Energy Corporation	7.01%	4.99%	5.10%		5.70%
Ameren Corporation ¹	2.35%	6.31%	0.73%		3.13%
American Electric Power Company, Inc.	4.83%	0.34%	3.25%		2.81%
Avista Corporation	4.27%	4.75%	4.67%		4.56%
CMS Energy Corporation	7.24%	4.47%	5.25%		5.65%
Duke Energy Corporation	2.90%	2.42%	1.26%		2.19%
Evergy, Inc.	NA	NA	NA		NA
IDACORP, Inc.	10.17%	3.85%	5.12%		6.38%
NorthWestern Corporation	7.25%	6.84%	7.80%		7.29%
OGE Energy Corp.	9.67%	4.66%	5.95%		6.76%
Pinnacle West Capital Corporation	3.06%	4.73%	4.25%		4.01%
PNM Resources, Inc.	11.11%	-4.94%	0.83%		2.33%
Portland General Electric Company	4.54%	5.12%	3.63%		4.43%
Southern Company	3.44%	-4.80%	3.01%		0.55%
Xcel Energy, Inc.	6.10%	4.80%	4.42%		5.11%
Average	6.28%	2.86%	4.19%		4.44%

Source: Market Intelligence

Notes: ¹ Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

**Union Electric Company
Case No. ER-2019-0335**

**Historical and Projected Growth Rates
for the Comparable Electric Utility Companies**

Company Name	(1) 10-Year Average DPS, EPS & BVPS	(2) 5-Year Average DPS, EPS & BVPS	(3) Mean Projected Long-Term Growth Rate
Alliant Energy Corporation	4.52%	5.70%	5.66%
Ameren Corporation ¹	-1.54%	3.13%	6.28%
American Electric Power Company, Inc.	2.85%	2.81%	5.82%
Avista Corporation	6.07%	4.56%	3.98%
CMS Energy Corporation	13.17%	5.65%	6.89%
Duke Energy Corporation	1.57%	2.19%	4.57%
Evergy, Inc.	NA	NA	6.17%
IDACORP, Inc.	6.28%	6.38%	3.50%
NorthWestern Corporation	6.77%	7.29%	3.41%
OGE Energy Corp.	6.60%	6.76%	5.18%
Pinnacle West Capital Corporation	3.37%	4.01%	5.29%
PNM Resources, Inc.	1.10%	2.33%	6.03%
Portland General Electric Company	3.50%	4.43%	4.84%
Southern Company	2.04%	0.55%	4.52%
Xcel Energy, Inc.	4.70%	5.11%	5.57%
Average	4.81%	4.44%	5.10%

Proposed Range of Growth for Comparables:

4.20% - 5.00%

Sources: Column 1 = Schedule 8-1 Market Intelligence

Column 2 = Schedule 8-2 Market Intelligence

Column 3 = Market Intelligence as of September, 2019

Notes: 1 Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

Union Electric Company
Case No. ER-2019-0335

Ten-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Spire Missouri Gas Proxy Group

<u>Company Name</u>	<u>10-Year Annual Compound Growth Rates</u>			<u>Average of Growth Rates</u>
	<u>DPS</u>	<u>EPS</u>	<u>BVPS</u>	
Atmos Energy Corporation	3.51%	7.92%	5.72%	5.71%
Northwest Natural Holding Company	2.64%	-0.99%	1.85%	1.17%
One Gas Inc.	NA	NA	NA	NA
Southwest Gas Holdings, Inc.	7.72%	7.23%	5.41%	6.79%
<u>Spire Inc.</u>	<u>3.74%</u>	<u>4.55%</u>	<u>7.44%</u>	<u>5.24%</u>
Average	4.40%	4.68%	5.10%	4.73%

NA = Not Available

Source: Market Intelligence

Union Electric Company
Case No. ER-2019-0335

**Five-Year Dividends Per Share, Earnings Per Share & Book Value Per Share Growth Rates
for the Spire Missouri Gas Proxy Group**

Company Name	5-Year Annual Compound Growth Rates				Average of Growth Rates
	DPS	EPS	BVPS		
Atmos Energy Corporation	5.54%	12.89%	7.25%		8.56%
Northwest Natural Holding Company	1.03%	0.55%	0.11%		0.57%
One Gas Inc.	NA	NA	NA		NA
Southwest Gas Holdings, Inc.	10.48%	5.21%	6.13%		7.27%
Spire Inc.	4.85%	7.49%	8.12%		6.82%
Average	5.47%	6.54%	5.40%		5.81%

Source: Market Intelligence

**Union Electric Company
Case No. ER-2019-0335**

**Historical and Projected Growth Rates
for the Spire Missouri Gas Proxy Group**

<u>Company Name</u>	(1) 10-Year Average DPS, EPS & BVPS	(2) 5-Year Average DPS, EPS & BVPS	(3) Mean Projected Long-Term Growth Rate
Atmos Energy Corporation	5.71%	8.56%	5.00%
Northwest Natural Holding Company	1.17%	0.57%	4.50%
One Gas Inc.	NA	NA	6.00%
Southwest Gas Holdings, Inc.	6.79%	7.27%	6.50%
Spire Inc.	5.24%	6.82%	6.00%
Average	4.73%	5.81%	5.60%

Proposed Range of Growth for Comparables:

4.20% - 5.00%

Sources: Column 1 = Schedule 8-1

Column 2 = Schedule 8-2

Column 3 = Market Intelligence as of September, 2019

**Union Electric Company
Case No. ER-2019-0335**

**Constant-Growth Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Electric Utility Companies**

	(1)	(2)	(3)
<u>Company Name</u>	<u>Expected Annual Dividend</u>	<u>Average High/Low Stock Price</u>	<u>Projected Dividend Yield</u>
Alliant Energy Corporation	\$1.49	\$51.22	2.90%
Ameren Corporation ¹	\$2.02	\$76.52	2.63%
American Electric Power Company, Inc.	\$2.82	\$90.77	3.11%
Avista Corporation	\$1.60	\$46.54	3.43%
CMS Energy Corporation	\$1.61	\$60.69	2.65%
Duke Energy Corporation	\$3.88	\$90.95	4.27%
Evergy, Inc.	\$2.01	\$63.14	3.19%
IDACORP, Inc.	\$2.62	\$106.33	2.47%
NorthWestern Corporation	\$2.38	\$72.13	3.30%
OGE Energy Corp.	\$1.58	\$43.25	3.65%
Pinnacle West Capital Corporation	\$3.13	\$93.97	3.33%
PNM Resources, Inc.	\$1.37	\$50.34	2.72%
Portland General Electric Company	\$1.60	\$55.68	2.87%
Southern Company	\$2.52	\$57.89	4.36%
Xcel Energy, Inc.	\$1.68	\$62.34	2.70%
Average			3.17%

Proposed Dividend Yield:

Proposed Range of Growth:

4.20% - 5.00%

Indicated Cost of Common Equity:

7.37% - 8.17%

Sources: Column 1 and 2 = Market Intelligence

Column 1 = Expected Annual Dividend based on the sum of equity analysts' expected next four quarters DPS.

Column 3 = Projected Dividend Yield = (Column 1 / Column 2)

Notes: ¹ Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

**Union Electric Company
Case No. ER-2019-0335**

**Current Constant-Growth Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases**

Company Name	(1) Expected Annual Dividend	(2) Average High/Low Stock Price	(3) Projected Dividend Yield
Atmos Energy Corporation	\$2.23	\$109.14	2.04%
Northwest Natural Holding Company	\$1.91	\$70.75	2.70%
One Gas, Inc.	\$2.12	\$91.11	2.33%
Southwest Gas Holdings, Inc.	\$2.27	\$89.94	2.53%
Spire, Inc.	\$2.47	\$84.19	2.93%
Average			<u>2.51%</u>

Proposed Dividend Yield: **2.51%**

Proposed Range of Growth: **4.20% - 5.00%**

Indicated Cost of Common Equity: **6.71% - 7.51%**

Notes: Column 1 = Expected Annual Dividend based on the sum of equity analysts' expected next four quarters DPS.
Column 3 = Projected Dividend Yield = (Column 1 / Column 2)

Union Electric Company
Case No. ER-2019-0335

Constant-Growth Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases

Company Name	(1) Expected Annual Dividend	(2) Average High/Low Stock Price	(3) Projected Dividend Yield
Atmos Energy Corporation	\$1.89	\$82.04	2.31%
Northwest Natural Holding Company	\$1.89	\$60.46	3.13%
One Gas, Inc.	\$1.76	\$69.73	2.52%
Southwest Gas Holdings, Inc.	\$2.03	\$79.89	2.53%
Spire, Inc.	\$2.15	\$69.85	3.07%
Average			<u>2.71%</u>

Proposed Dividend Yield: 2.71%

Proposed Range of Growth: 4.20% - 5.00%

Indicated Cost of Common Equity: 6.91% - 7.71%

Notes: Column 1 = Expected Annual Dividend based on the sum of equity analysts' expected next four quarters DPS.
 Column 3 = Projected Dividend Yield = (Column 1 / Column 2)

Source: Case Nos. GR-2017-0215 & GR-2017-0216, Staff Report, Cost of Service, Appendix 2, Shedule 10.

Union Electric Company
ER-2019-0335

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

Company Name	(1) Risk Free Rate	(2) Company's Value Line Beta	(3) Geometric Average Market Risk Premium (1926-2018)	(4) Arithmetic Average Market Risk Premium (1926-2018)	(5) Geometric CAPM Cost of Common Equity (1926-2018)	(6) Arithmetic CAPM Cost of Common Equity (1926-2018)
Alliant Energy Corporation	2.29%	0.55	4.50%	6.00%	4.77%	5.60%
Ameren Corporation ¹	2.29%	0.54	4.50%	6.00%	4.71%	5.52%
American Electric Power Company, Inc.	2.29%	0.49	4.50%	6.00%	4.50%	5.23%
Avista Corporation	2.29%	0.55	4.50%	6.00%	4.77%	5.60%
CMS Energy Corporation	2.29%	0.50	4.50%	6.00%	4.53%	5.27%
Duke Energy Corporation	2.29%	0.46	4.50%	6.00%	4.35%	5.03%
Evergy, Inc.	2.29%	0.40	4.50%	6.00%	4.08%	4.67%
IDACORP, Inc.	2.29%	0.52	4.50%	6.00%	4.62%	5.40%
NorthWestern Corporation	2.29%	0.54	4.50%	6.00%	4.74%	5.56%
OGE Energy Corp.	2.29%	0.73	4.50%	6.00%	5.55%	6.64%
Pinnacle West Capital Corporation	2.29%	0.48	4.50%	6.00%	4.47%	5.19%
PNM Resources, Inc.	2.29%	0.54	4.50%	6.00%	4.74%	5.56%
Portland General Electric Company	2.29%	0.52	4.50%	6.00%	4.62%	5.40%
Southern Company	2.29%	0.46	4.50%	6.00%	4.35%	5.03%
Xcel Energy, Inc.	2.29%	0.46	4.50%	6.00%	4.35%	5.03%
Average		<u>0.52</u>			<u>4.61%</u>	<u>5.38%</u>

Column 1 = The appropriate yield is equal to the average 30-year U.S. Treasury Bond yield for July, August, and September 2019 which was obtained from the St. Louis Federal Reserve website at <http://research.stlouisfed.org/fred2/series/GS30/22>.

Column 2 = Beta is a measure of the movement and relative risk of an individual stock to the market as a whole generate by the SNL Beta Stock Generator September 30, 2014 through September 30, 2019.

Column 3 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 4.50% based on a geometric average as calculated in Duff & Phelps' 2019 SBB1 Yearbook.

Column 4 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 6.00% based on an arithmetic average as calculated in Duff & Phelps' 2019 SBB1 Yearbook.

Column 5 = (Column 1 + (Column 2 * Column 3))

Column 6 = (Column 1 + (Column 2 * Column 4))

Notes: ¹ Ameren appears in Staff's Schedules for reference. Staff's analysis of the proxy group excludes Ameren Data.

**Union Electric Company
ER-2019-0335**

**Current Capital Asset Pricing Model (CAPM) Costs of Common Equity Estimates
Based on Historical Return Differences Between Common Stocks and Long-Term U.S. Treasuries
for the Comparable Gas Utility Companies Staff Presented in the Spire Missouri Rate Cases**

Company Name	(1) Risk Free Rate	(2) Company's Value Line Beta	(3) Geometric Average Market Risk Premium (1926-2018)	(4) Arithmetic Average Market Risk Premium (1926-2018)	(5) Geometric CAPM Cost of Common Equity (1926-2018)	(6) Arithmetic CAPM Cost of Common Equity (1926-2018)
Atmos Energy Corporation	2.29%	0.57	4.50%	6.00%	4.86%	5.72%
Northwest Natural Holding Company	2.29%	0.52	4.50%	6.00%	4.62%	5.40%
One Gas, Inc.	2.29%	0.58	4.50%	6.00%	4.92%	5.80%
Southwest Gas Holdings, Inc.	2.29%	0.63	4.50%	6.00%	5.13%	6.03%
Spire, Inc.	2.29%	0.60	4.50%	6.00%	4.98%	5.88%
Average		<u><u>0.58</u></u>			<u><u>4.90%</u></u>	<u><u>5.77%</u></u>

Column 1 = The appropriate yield is equal to the average 30-year U.S. Treasury Bond yield for July, August and September 2019, which was obtained from the St. Louis Federal Reserve website at <http://research.stlouisfed.org/fred2/series/GS30/22>

Column 2 = Beta is a measure of the movement and relative risk of an individual stock to the market as a whole generate by the SNL Beta Stock Generator September 30, 2014 through September 30, 2019.

Column 3 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 6.00% based on an arithmetic average as calculated in Duff & Phelps' 2019 SBBi Yearbook.

Column 4 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2018 was determined to be 4.50% based on a geometric average as calculated in Duff & Phelps' 2019 SBBi Yearbook.

Column 5 = (Column 1 + (Column 2 * Column 3)).

Column 6 = (Column 1 + (Column 2 * Column 4)).

**Union Electric Company
ER-2019-0335**

**Capital Asset Pricing Model (CAPM) Costs of Common Equity Estimates Staff Presented in the Spire Rate Cases
Based on Historical Return Differences Between Common Stocks and Long-Term U.S. Treasuries
for the Comparable Gas Utility Companies**

Company Name	(1) Risk Free Rate	(2) Company's Value Line Beta	(3) Geometric Average Market Risk Premium (1926-2016)	(4) Arithmetic Average Market Risk Premium (1926-2016)	(5) Geometric CAPM Cost of Common Equity (1926-2016)	(6) Arithmetic CAPM Cost of Common Equity (1926-2016)
Atmos Energy Corporation	2.90%	0.71	4.50%	6.00%	6.10%	7.17%
Northwest Natural Holding Company	2.90%	0.66	4.50%	6.00%	5.89%	6.89%
One Gas, Inc.	2.90%	0.77	4.50%	6.00%	6.37%	7.53%
Southwest Gas Holdings, Inc.	2.90%	0.71	4.50%	6.00%	6.10%	7.17%
Spire, Inc.	2.90%	0.69	4.50%	6.00%	5.92%	6.93%
Average		0.71			6.08%	7.14%

Source: Case Nos. GR-2017-0215 & GR-2017-0216, Staff Report, Cost of Service, Appendix 2, Shedule 11.

Column 1 = The appropriate yield is equal to the average 30-year U.S. Treasury Bond yield for April, May and June 2017, which was obtained from the St. Louis Federal Reserve website at <http://research.stlouisfed.org/fred2/series/GS30/22>

Column 2 = Beta is a measure of the movement and relative risk of an individual stock to the market as a whole generate by the SNL Beta Stock Generator June 30, 2012 through June 30, 2017.

Column 3 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2016 was determined to be 6.00% based on an arithmetic average as calculated in Valuation Handbook by Duff & Phelps.

Column 4 = The Market Risk Premium represents the expected return from holding the entire market portfolio less the expected return from holding a risk free investment. The appropriate Market Risk Premium for the period 1926 - 2016 was determined to be 4.50% based on a geometric average as calculated in Valuation Handbook by Duff & Phelps.

Column 5 = (Column 1 + (Column 2 * Column 3)).

Column 6 = (Column 1 + (Column 2 * Column 4)).

**Union Electric Company
ER-2019-0335**

Summary of Staff's Cost of Equity Estimates

Staff's Current Cost of Equity Estimates for the Electric Proxy Group

<u>DCF Range of Growth %</u>	<u>4.20%</u>	<u>5.00%</u>	<u>Average</u>
DCF	7.37%	8.17%	7.77%
	<u>Geometric</u>	<u>Arithmetic</u>	<u>Average</u>
CAPM	4.61%	5.38%	5.00%
		Average	6.38%

Staff's Current Cost of Equity Estimates for the Gas Proxy Group

<u>DCF Range of Growth %</u>	<u>4.20%</u>	<u>5.00%</u>	<u>Average</u>
DCF	6.71%	7.51%	7.11%
	<u>Geometric</u>	<u>Arithmetic</u>	<u>Average</u>
CAPM	4.90%	5.77%	5.34%
		Average	6.22%

Staff's Cost of Equity Estimates for the Gas Proxy Group in the Spire Missouri Cases

<u>DCF Range of Growth %</u>	<u>4.20%</u>	<u>5.00%</u>	<u>Average</u>
DCF	6.91%	7.71%	7.31%
	<u>Geometric</u>	<u>Arithmetic</u>	<u>Average</u>
CAPM	6.08%	7.14%	6.61%
		Average	6.96%

Average COE Difference Between Current Electric and Gas Proxy Groups ¹	0.16%
Difference in Average COE for Gas Proxy Group Between Rate Cases ²	-0.74%
Implied COE Differential for Electric Proxy Group	-0.58%
Commission allowed ROE in Spire Missouri rate cases	9.80%
Implied COE Differential for Electric Proxy Group	-0.58%
Staff recommended allowed ROE for Ameren Missouri Electric ³	9.22%

Notes:

1. COE for current Electric Proxy (6.38) - COE for Current Gas Proxy (6.22)
2. COE for Gas Proxy during Spire Missouri rate cases (6.96) - COE for Gas Proxy during current case (6.22)
3. Staff rounded the recommendation up to 9.25%.
4. Staff's estimate of Ameren Missouri's market bases COE is 6.17% $((6.83 + 7.63 + 4.71 + 5.52)/4)$

**Union Electric Company
ER-2019-0335**

**Recommended Allowed Rate of Return as of June 30, 2019
for
Ameren Missouri**

Capital Component	Percentage of Capital	Embedded Cost	Allowed Rate of Return Common Equity Return of:		
			8.75%	9.25%	9.75%
Long-Term Debt	49.02%	4.60%	2.26%	2.26%	2.26%
Preferred Stock	0.98%	4.18%	0.04%	0.04%	0.04%
Common Equity	<u>50.00%</u>		<u>4.38%</u>	<u>4.63%</u>	<u>4.88%</u>
Total	<u>100.00%</u>		<u>6.67%</u>	<u>6.92%</u>	<u>7.17%</u>

MISSOURI PUBLIC SERVICE COMMISSION

STAFF REPORT

APPENDIX 3

Other Staff Schedules

**UNION ELECTRIC COMPANY,
d/b/a Ameren Missouri**

CASE NO. ER-2019-0335

*Jefferson City, Missouri
December 2019*

Staff Exhibit No. 102
Date 3/4/20 Reporter JMB
File No. ER-2019-0335

Solar Electrical Generator

In-Service Test Criteria

1. All major construction work is complete.
2. All preoperational tests have been successfully completed.
3. Facility successfully meets contract operational guarantees that are necessary for satisfactory completion of all other items in this list.
4. Upon observation of the facility for 72 consecutive hours the facility will have demonstrated that when sunlight was shining on it during that period it produced power in a standard operating mode.
5. Facility shall meet at least 95% of the guaranteed capacity (in MW AC) based on the Capacity Test in Exhibit 1. The Capacity Test shall determine the facility's Corrected Capacity at the Design Point Conditions.
6. Sufficient transmission/distribution interconnection facilities shall exist for the total plant design net electrical capacity at the time the facility is declared fully operational and used for service.
7. Sufficient transmission/distribution facilities shall exist for the total plant design net electrical capacity into the utility service territory at the time the facility is declared fully operational and used for service.

Exhibit 1

Definitions:

“Corrected Capacity” means the most recent actual tested Capacity, in MW, corrected to Design Point Conditions (DPC) as described herein.

“Design Point Conditions” (DPC) means a set of ambient reference conditions, which include a solar irradiance of 1050 watts per meter square, module cell temperature of forty-five degrees (45°) Celsius, atmospheric air mass of 1.5 or less and wind speed of one (1) meter per second.

“POA” means plane of array irradiance.

The Capacity Test shall determine the Corrected Capacity at the Design Point Conditions. Capacity Test will be based on the relevant environmental conditions in the field at the time of such test, including field irradiance and temperature. The measured Capacity shall then be “corrected” to the Design Point Conditions and the resulting Corrected Capacity shall be compared to the Guaranteed Capacity as set forth herein.

The Capacity Test data shall consist of a minimum of 50, 15 minute blocks of average Plane of Array Irradiance (POA) solar irradiance data; where POA is at least 500 W/m².

a. Calculations Procedures:

$$(1) T_{cell} = T_{module} + 1.5$$

$$(2) W_{COR} = W_{meas} * (IRR_{DPC} / IRR) * (1 / (1 + TCOEFF(T_{cell} - T_{DPC})))$$

$$(3) W_{guar} = \frac{W_{COR}}{W_{GUAR}}$$

Where...

- W_{MEAS} = Measured AC capacity in [MW]
- W_{COR} = Corrected AC capacity at Design Point Condition (DPC) in [MW]
- IRR_{DPC} = Direct normal irradiance at DPC (1050 W/m²) in [W/m²]
- IRR = Measured irradiance in [W/m²]
- TCOEFF = Temperature coefficient of maximum power of installed panel (-0.0044/°C) [°C]

- T_{module} = Measured module temperature in [$^{\circ}\text{C}$]
- T_{cell} = Measured cell temperature in [$^{\circ}\text{C}$]
- T_{DPC} = Temperature at DPC (45°C) in [$^{\circ}\text{C}$]
- W_{GUAR} = Guaranteed AC capacity of the system (4.5 MW-AC) in [MW]

Note: Cell temperature is calculated based on the module temperature readings taken from a T-type thermocouple placed on the underside and center of the DUT. A correction factor of 1.5°C is assumed for backsheet to cell temperature as per the standard practice of glass and backsheet constructed c-Si modules.

<u>Depreciable Group</u>	<u>Probable Retirement Year</u>	<u>Average Life</u>	<u>Net Salvage Rate Percent</u>	<u>Depreciation Rate</u>
Steam Production Plant				
Meramec Steam Production Plant				
311 Structures and Improvements	Sep-22	90	0	6.09
312 Boiler Plant Equipment	Sep-22	55	(1)	8.43
314 Turbogenerator Units	Sep-22	60	0	6.44
315 Accessory Electric Equipment	Sep-22	75	0	8.57
316 Miscellaneous Power Plant Equipment	Sep-22	40	0	16.85
316.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
316.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
316.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
Sioux Steam Production Plant				
311 Structures and Improvements	Sep-33	90	(1)	3.74
312 Boiler Plant Equipment	Sep-33	55	(3)	4.57
314 Turbogenerator Units	Sep-33	60	(1)	4.32
315 Accessory Electric Equipment	Sep-33	75	(1)	4.88
316 Miscellaneous Power Plant Equipment	Sep-33	40	0	6.34
316.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
316.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
316.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
Labadie Steam Production Plant				
311 Structures and Improvements	Sep-42	90	(2)	3.04
312 Boiler Plant Equipment	Sep-42	55	(6)	3.39
312.03 Boiler Plant Equipment - Aluminum Coal Cars		30	25	0.39
314 Turbogenerator Units	Sep-42	60	(2)	2.78
315 Accessory Electric Equipment	Sep-42	75	(2)	2.70
316 Miscellaneous Power Plant Equipment	Sep-42	40	0	4.02
316.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
316.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
316.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
Rush Island Steam Production Plant				
311 Structures and Improvements	Sep-45	90	(1)	2.52
312 Boiler Plant Equipment	Sep-45	55	(7)	3.00
314 Turbogenerator Units	Sep-45	60	(3)	2.70
315 Accessory Electric Equipment	Sep-45	75	(2)	2.42
316 Miscellaneous Power Plant Equipment	Sep-45	40	0	4.14
316.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
316.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
316.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00

<u>Depreciable Group</u>	<u>Probable Retirement Year</u>	<u>Average Life</u>	<u>Net Salvage Rate Percent</u>	<u>Depreciation Rate</u>
Common - All Steam Plants				
311 Structures and Improvements	Sep-42	90	(2)	2.69
312 Boiler Plant Equipment	Sep-42	55	(6)	2.70
315 Accessory Electric Equipment	Sep-42	75	(2)	2.72
316 Miscellaneous Power Plant Equipment	Sep-42	40	0	3.54
Nuclear Production Plant				
Callaway				
321 Structures and Improvements	Oct-44	90	(1)	1.54
322 Reactor Plant Equipment	Oct-44	50	(6)	2.95
323 Turbogenerator Units	Oct-44	50	(4)	2.66
324 Accessory Electric Equipment	Oct-44	75	(1)	2.05
325 Miscellaneous Power Plant Equipment	Oct-44	35	0	4.71
325.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
325.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
325.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
Hydraulic Production Plant				
Osage Hydraulic Production Plant				
331 Structures and Improvements	Jun-47	125	(2)	3.24
332 Reservoirs, Dams, and Waterways	Jun-47	150	(1)	2.80
333 Water Wheels, Turbines, and Generators	Jun-47	95	(8)	2.80
334 Accessory Electric Equipment	Jun-47	65	(1)	3.12
335 Miscellaneous Power Plant Equipment	Jun-47	50	0	4.50
335.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
335.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
335.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
336 Roads, Railroads, and Bridges	Jun-47	50	0	0.00
Taum Sauk Hydraulic Production Plant				
331 Structures and Improvements	Jun-89	125	(5)	1.36
332 Reservoirs, Dams, and Waterways	Jun-89	150	(3)	2.59
333 Water Wheels, Turbines, and Generators	Jun-89	95	(26)	1.95
334 Accessory Electric Equipment	Jun-89	65	(3)	1.82
335 Miscellaneous Power Plant Equipment	Jun-89	50	0	2.43
335.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
335.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
335.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
336 Roads, Railroads, and Bridges	Jun-89	50	0	1.39

<u>Depreciable Group</u>	<u>Probable Retirement Year</u>	<u>Average Life</u>	<u>Net Salvage Rate Percent</u>	<u>Depreciation Rate</u>
Keokuk Hydraulic Production Plant				
331 Structures and improvements	Jun-55	125	(3)	2.28
332 Reservoirs, Dams, and Waterways	Jun-55	150	(1)	1.64
333 Water Wheels, Turbines, and Generators	Jun-55	95	(10)	2.60
334 Accessory Electric Equipment	Jun-55	65	(1)	2.62
335 Miscellaneous Power Plant Equipment	Jun-55	50	0	3.04
335.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
335.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
335.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
336 Roads, Railroads, and Bridges	Jun-55	50	0	1.13
Other Production Plant				
341 Structures and improvements		40	(5)	2.41
342 Fuel Holders, Producers, and Accessories		45	(5)	2.05
344 Generators				
Other CTS		45	(5)	1.66
Maryland Heights Landfill CTG		8	40	1.86
Solar		20	0	4.19
345 Accessory Electric Equipment		40	(5)	2.12
346 Miscellaneous Power Plant Equipment		22	0	3.30
346.21 Miscellaneous Power Plant Equipment - Office Furniture		20	0	5.00
346.22 Miscellaneous Power Plant Equipment - Office Equipment		15	0	6.67
346.23 Miscellaneous Power Plant Equipment - Computers		5	0	20.00
Transmission Plant				
352 Structured and Improvements		65	(5)	1.95
353 Station Equipment		60	(5)	1.70
354 Towers and Fixtures		70	(40)	2.32
355 Poles and Fixtures		60	(100)	3.39
356 Overhead Conductors and Devices		60	(25)	2.11
359 Roads and Trails		70	0	0.00

<u>Depreciable Group</u>	<u>Probable Retirement Year</u>	<u>Average Life</u>	<u>Net Salvage Rate Percent</u>	<u>Depreciation Rate</u>
Distribution Plant				
361 Structures and Improvements		60	(5)	1.85
362 Station Equipment		60	(10)	1.85
364 Poles and Fixtures		50	(150)	4.54
365 Overhead Conductors and Devices		50	(50)	2.97
366 Underground Conduit		70	(50)	2.28
367 Underground Conductors and Devices		57	(40)	2.55
368 Line Transformers		42	5	2.21
369.1 Overhead Services		47	(200)	5.13
369.2 Underground Services		60	(90)	2.78
370 Meters		28	(5)	3.57
371 Installations on Customers' Premises		30	0	0.00
373 Street Lighting and Signal Systems		38	(35)	2.95
General Plant				
390 Structures and Improvements				
Miscellaneous Structures - Old		45	(10)	2.86
Large Structures		50	(10)	2.24
390.05 Structures and Improvements - Training Assets		5	0	0.00
391 Office Furniture and Equipment - Furniture		20	0	5.00
391.2 Office Furniture and Equipment - Personal Computers		5	0	20.00
391.3 Office Furniture and Equipment - Equipment		15	0	6.67
392 Transportation Equipment		11	15	7.05
392.05 Transportation Equipment - Training Assets		5	0	0.00
393 Stores Equipment		20	0	5.00
394 Tools, Shop, and Garage Equipment		20	0	5.00
394.05 Tools, Shop, and Garage Equipment - Training Assets		5	0	20.00
395 Laboratory Equipment		20	0	5.00
396 Power Operated Equipment		15	15	6.27
397 Communication Equipment		15	0	6.67
397.05 Communication Equipment - Training Assets		5	0	0.00
398 Miscellaneous Equipment		20	0	5.00

SCHEDULE LMF-d1

HAS BEEN DEEMED

CONFIDENTIAL

IN ITS ENTIRETY

1 rail transportation fuel surcharges. These hedges are tied to the prices of on-highway diesel as
2 reported by the Energy Information Administration, an independent statistical agency of the
3 U.S. Department of Energy (DOE). Finally, Staff included all railcar-related costs as a
4 component of the accounting coal price used in the production cost model.

5 *Staff Expert/Witness: Lisa M. Ferguson*

6 **ii. Fly Ash**

7 Staff accepted the test year amount of expenses in its revenue requirement cost of service
8 to account for the lower amount received by Ameren Missouri through the sale of its fly ash for
9 concrete production. Coal refinement that is currently ongoing at many of the coal energy
10 centers has made the fly ash unsellable. This amount must be included as an increase to Staff's
11 production cost model results, which are based on the amount of fly ash produced which varies
12 in relationship to the amount of coal burned. If the fly ash is not sold, it creates a cost for
13 disposal for Ameren Missouri.

14 *Staff Expert/Witness: Lisa M. Ferguson*

15 **b. Nuclear Fuel Prices**

16 **i. Nuclear Fuel Rod Assembly Prices**

17 Uranium is a naturally slightly radioactive metal that represents the raw material that
18 undergoes a complex three-stage process, involving conversion, enrichment and fabrication, in
19 order to transform the metal into fuel rod assemblies (long metal tubes filled with precisely
20 fashioned small fuel pellets) that are placed in the Callaway reactor as its source of fuel. The
21 nuclear fuel price represents the cost of all of the fuel rod assemblies that are loaded in
22 the reactor. Staff used in its case forecasted nuclear fuel prices for the period ending
23 December 2014 as provided by Company in its response to Staff Data Request No. 0097. Staff
24 will re-examine the actual nuclear fuel prices at year-end 2014 as part of its true-up audit and
25 will reflect those costs once they are available.

26 **ii. Spent-Fuel Costs**

27 The Nuclear Regulatory Commission separates wastes into two broad classifications:
28 high-level or low-level waste. High-level radioactive waste consists of "irradiated" or used
29 nuclear reactor fuel (i.e., fuel that has been used in a reactor to produce electricity). The used
30 reactor fuel is in a solid form consisting of small fuel pellets in long metal tubes. Used reactor

1 fuel is commonly referred to as “spent fuel.” High level and low level waste will be discussed at
2 length in the next sections of this Report.

3 In this rate case, Staff has not included costs associated with the disposal of spent nuclear
4 fuel as a component of the overall nuclear fuel price that was used as an input for Staff’s
5 production cost model. In the past, a spent-fuel fee component was incorporated in the nuclear
6 fuel prices used for input into the production cost model. However, earlier this year the DOE
7 was ordered by the United States Federal Court to discontinue the collection of this fee effective
8 May 16, 2014. Because of this recent development, Staff has excluded this component of
9 nuclear fuel cost from inclusion in the cost of service calculation. Staff also points out that the
10 reduction in the nuclear waste fee passes through Ameren Missouri’s FAC mechanism.
11 Therefore, the reduction in cost is passed on to electric customers.

12 **iii. Spent Fuel and DOE Breach of Contract Settlements with**
13 **Ameren Missouri**

14 The following provides a narrative synopsis of the origination of the spent-fuel fee that
15 was designed to remove and store high-level radioactive waste and the developments which led
16 to the eventual discontinuance of the fee, as well as lawsuits filed by Ameren Missouri against
17 the government for breach of contract associated with the spent-fuel fee. At the end of this
18 section, a chart is presented which summarizes the settlements Ameren Missouri has received to
19 date related to the spent-fuel fee as well as the Company’s accounting treatment of these
20 settlements.

21 In 1982, the United States Congress enacted the Nuclear Waste Policy Act (NWP),
22 which was signed into law by President Reagan on January 7, 1983. This legislation defined the
23 federal government’s responsibility to provide permanent disposal in a deep geological
24 repository for spent fuel and high-level radioactive waste from commercial and defense
25 activities. Under the NWP, Ameren Missouri and all other utilities that own and operate those
26 energy centers were responsible for paying the disposal costs to the federal government.
27 A spent-fuel fee was developed to address the disposal of the spent nuclear fuel at one mill, or
28 one-tenth of one cent, for each kilowatt-hour of electricity that each electric utility nuclear
29 energy center generates and sells. The NWP also required the DOE to review the nuclear
30 waste fee against the cost of the overall nuclear waste disposal program and to propose to the
31 United States Congress any fee adjustment necessary to offset the costs of the program.

1 Consistent with the NWPA, Ameren Missouri entered into a contract with the DOE on
2 March 6, 1984. Ameren Missouri's contract provided that it would pay the government fees that,
3 together with the fees paid by all other utilities under similar contracts, would be sufficient for
4 DOE to implement and operate a program for the prompt removal of the spent nuclear fuel from
5 Ameren Missouri's Callaway Plant and all other nuclear power plants nationwide. The contract
6 terms required the DOE to commence removal of spent nuclear fuel no later than January 31,
7 1998. The DOE failed to commence removing spent nuclear fuel by January 31, 1998. The
8 United States Court of Appeals for the Federal Circuit held that this failure to commence
9 removal of spent nuclear fuel in 1998 constituted a breach of the government's contractual
10 obligation to the nuclear utilities that signed contracts with DOE pursuant to the NWPA.

11 In February 2002, after many years of studying its suitability, DOE recommended to
12 President George W. Bush that a site at Yucca Mountain, Nevada, be developed as a long-term
13 geologic repository for high-level waste. On June 3, 2008, the DOE submitted a license
14 application to the U.S. Nuclear Regulatory Commission ("NRC"), seeking authorization to
15 construct a deep geologic repository for disposal of high-level radioactive waste at
16 Yucca Mountain. On March 3, 2010, the DOE filed a motion with the Atomic Safety and
17 Licensing Board ("Board") seeking permission to withdraw its application for authorization to
18 construct a high-level waste geological repository at Yucca Mountain. The Board denied that
19 request on June 29, 2010, in LBP-10-11, and the parties filed petitions asking the Commission to
20 uphold or reverse this decision. On October 1, 2010, the NRC began orderly closure of its
21 Yucca Mountain activities. The federal government took steps to terminate the Yucca Mountain
22 program, while acknowledging its continuing obligation to dispose of utilities' spent
23 nuclear fuel.

24 Because of the federal government's efforts to terminate the Yucca Mountain program,
25 the Nuclear Energy Institute, a number of individual utilities, and the National Association of
26 Regulatory Utility Commissioners sued the DOE in the United States Court of Appeals for the
27 District of Columbia Circuit, seeking the suspension of the one mill nuclear waste fee, alleging
28 that the DOE failed to undertake an appropriate fee adequacy review reflecting the current
29 unsettled state of the nuclear waste program. In a June 2012 decision, the court ruled that the
30 DOE's fee adequacy review was legally inadequate and remanded the matter to the DOE.
31 Although the court ruled it has the power to direct the DOE to suspend the fee, the court decided

1 that it was premature to do so. Instead, the court ordered the DOE to provide within six months
2 a revised assessment of the amount that should be collected. In January 2013, the DOE issued
3 the revised assessment required by the court. The DOE determined that "*neither insufficient nor*
4 *excess revenues are being collected,*" and it proposed no adjustment to the one mill nuclear
5 waste fee. In November 2013, the court rejected the DOE's revised assessment and ordered the
6 DOE to submit a proposal to the United States Congress to reduce the fee to zero. Effective
7 May 16, 2014, the spent-fuel fee was reduced to zero.

8 There are currently two acceptable storage methods for spent fuel after it is removed from
9 the reactor core: (a) Spent-Fuel Pools - where most spent nuclear fuel is safely stored in
10 specially-designed pools at individual reactor sites and (b) Dry Cask Storage - which represents
11 an alternative storage once the spent-fuel pool capacity is reached.

12 As a result of the DOE's failure to begin to dispose of spent nuclear fuel and to fulfill its
13 contractual obligations, in 1999 Ameren Missouri increased the capacity of Callaway's spent-
14 fuel storage pool from its original designed storage capacity of 1,340 spent-fuel assemblies to
15 approximately 2,360 spent-fuel assemblies. This expansion was accomplished by "re-racking,"
16 which involved replacing the existing storage racks with new racks having additional storage
17 capacity. In addition, Ameren Missouri has begun construction of a dry cask storage facility.
18 Ameren Missouri and other nuclear energy center owners sued the DOE to recover costs incurred
19 for re-racking spent-fuel pools, as well as for dry cask storage and other ongoing costs associated
20 with storing spent fuel. Ameren Missouri's lawsuit to recover damages associated with the
21 re-racking was filed in 2004. The case was formally stayed until early 2010, in order to allow
22 Ameren Missouri to take advantage of rulings obtained in other earlier spent-fuel cases. Ameren
23 Missouri was required to document its damages claim by August 31, 2010. Ameren Missouri
24 had several discussions with the U.S. Department of Justice ("DOJ"), which represents the DOE
25 in spent-fuel litigation, and Ameren Missouri obtained a very good understanding of the terms on
26 which the DOJ would be willing to settle individual cases. The spent-fuel settlement would
27 cover both past and future damages. Essentially, by settling with DOJ, the settling utilities' past
28 costs are paid by the government when the settlement agreement is signed, and the agreement
29 establishes an administrative claims process pursuant to which the utility may submit claims for
30 ongoing damages annually, for evaluation and payment outside the judicial process.

1 In June 2011, Ameren Missouri entered into a settlement agreement that provides for
 2 recovery for its re-racking expenditures in 1999 and other related costs as well as all annual
 3 recovery of additional spent-fuel storage and related costs incurred from 2010 through 2013,
 4 with the ability to extend the recovery period as mutually agreed to by the parties. The parties
 5 have agreed in principle to extend the recovery period through 2016.

6 To date, Ameren Missouri has received the following reimbursements:

7	July 2011	\$ 10,551,468
8	October 2012	\$ 818,692
9	November 2013	\$ 6,227,978

10 The July 2011 reimbursement was for re-racking that was completed in 1999, O&M expenses
 11 incurred in years prior to 2011, and costs incurred on the new dry cask storage project. For the
 12 portion of the settlement received for the re-racking project, Ameren Missouri reduced the
 13 plant-in-service and depreciation reserve balances for the applicable plant-in-service accounts by
 14 the amount of the proceeds. The prior year O&M reimbursement was recorded below-the-line as
 15 miscellaneous non-operating revenue and the reimbursement for the costs incurred on the new
 16 dry cask storage project were recorded as a reduction to the Construction Work in Progress
 17 balance at that time for that item. The reimbursements received in 2012 and 2013 were related to
 18 the new dry cask storage project and Construction Work in Progress was reduced for these
 19 reimbursements.

20 The following summarizes how the Company recorded these transactions on their books:

21	Debt (DR)	Credit (CR)	
22	July 2011		
23	DR Acct 131	Cash	9,117,418
24	CR Acct 322	Reactor Plant in Service	(9,117,418)
25			
26	DR Acct 322	Reactor Plant (Reserve)	2,522,188
27	CR Acct 403	Depreciation Expense	(2,522,188)
28			
29	DR Acct 131	Cash	1,360,156
30	CR Acct 421	Miscellaneous Non-Operating Revenue	
31			
32		(Reimbursement of O&M)	(1,360,156)
33			
34	DR Acct 131	Cash	73,894
35	CR	CWIP	(73,894)
36			

1	October 2012		
2	DR Acct 131	Cash	818,692
3	CR	CWIP	(818,692)
4			
5	November 2013		
6	DR Acct 131	Cash	6,227,978
7	CR	CWIP	(6,227,978)

8 Staff does not agree with the Company's treatment of the \$1.36 million of reimbursements it
9 received in July 2011 that related to a reimbursement of prior period O&M costs. By recording
10 the \$1.4 million as miscellaneous non-utility operating revenue in a below-the-line account,
11 Ameren Missouri pocketed the refund and made no attempt to return any of these proceeds to the
12 ratepayers that funded these O&M activities. Based upon advice from counsel, attempting to
13 recover this cost during this rate case would constitute retroactive ratemaking, thus Staff does not
14 propose an adjustment. However, Staff recommends that the Commission order the Company to
15 return all future refunds that stem from settlements that Ameren Missouri has reached with DOE
16 to ratepayers Staff believes without such protection from the Commission that unjust and
17 unreasonable rates would result. Staff does agree with the Company's treatment of the
18 remainder of the settlement in amounts received during 2011. Staff also agrees with the
19 Company with regard to the 2012 and 2013 settlements since the investment costs of the dry cask
20 project will not be charged to ratepayers.

21 In March 2014, Ameren Missouri submitted additional costs to the DOE for
22 reimbursement under the settlement agreement. Ameren Missouri expects to receive a cost
23 reimbursement of approximately \$14.9 million during the fourth quarter of 2014 from this
24 submission. Included in these reimbursements are costs related to a dry spent-fuel storage
25 facility Ameren Missouri is constructing at its Callaway Energy Center. Ameren Missouri
26 intends to begin transferring spent-fuel assemblies to this dry spent-fuel storage facility in 2015.
27 Until the facility is completed, Ameren Missouri will apply for reimbursement from the DOE for
28 the cost to construct the dry spent-fuel storage facility along with related allowable costs.
29 Ameren Missouri has indicated that it intends to record these reimbursements in the same way
30 that the reimbursements that were received in 2012 and 2013 were recorded on the Company's
31 books. Staff intends to monitor this settlement in order to ensure that ratepayers are made whole
32 for the proceeds that are returned to Ameren Missouri.

1 In January 2013, the DOE issued its plan for the management and disposal of spent
2 nuclear fuel. The DOE's plan calls for a pilot interim storage facility to begin operation with an
3 initial focus on accepting spent nuclear fuel from shutdown reactor sites by 2021. By 2025, a
4 larger interim storage facility would be available, co-located with the pilot facility. The plan also
5 proposes to site a permanent geological repository by 2026, to characterize the site and to design
6 and to license the repository by 2042, and to begin operation by 2048.

7 *Staff Expert/Witness: Lisa M. Ferguson*

8 **c. Natural Gas Cost**

9 **i. Variable Natural Gas Cost**

10 Staff analyzed natural gas prices over a three-year period ending in July 31, 2014, using
11 data provided in response to Staff Data Request No. 0089 and data submitted by Ameren
12 Missouri as per the 4 CSR 240-3.190 Reporting Requirements for Electric Utilities and Rural
13 Electric Cooperatives rule. Staff calculated the average system price per month using the three
14 years of monthly data ending July 31, 2014. Staff calculated the three-year average natural gas
15 price by month and used these three-year averages for inputs to the fuel model. Staff will
16 continue to review natural gas prices through the true-up period ending December 31, 2014, and
17 will make adjustments as necessary.

18 *Staff Expert/Witness: Erin L. Maloney*

19 **ii. Fixed Natural Gas Cost**

20 Staff has included the fixed demand cost of gas for the twelve months ending
21 September 30, 2014, in its recommended revenue requirement. This amount must be added to
22 Staff's production cost model results, which are based on only the variable commodity cost of
23 gas in order to determine total net fuel and purchased-power expense. Staff will also examine
24 this cost through the true-up cut-off date in this case.

25 *Staff Expert/Witness: Lisa M. Ferguson*

26 **d. Fuel Oil Prices**

27 Fuel oil plays a very small part in the total fuel costs of Ameren Missouri. It is mainly
28 used for start-up and auxiliary purposes at the generating stations. The fuel oil price
29 recommended by Staff was calculated from the monthly average fuel oil prices Ameren Missouri

SCHEDULE LMF-d3

HAS BEEN DEEMED

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