

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. GR-2019-0077

*Jefferson City, Missouri
April 2019*

AN ANALYSIS OF THE COST OF CAPITAL

FOR

UNION ELECTRIC COMPANY

CASE NO. GR-2019-0077

SCHEDULES

BY

Jeffrey Smith

Financial Analysis

MISSOURI PUBLIC SERVICE COMMISSION

April 2019

**Union Electric Company
Case No. GR-2019-0077**

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**Union Electric Company
Case No. GR-2019-0077**

Federal Reserve Discount Rate Changes and Federal Reserve Funds Rate Changes

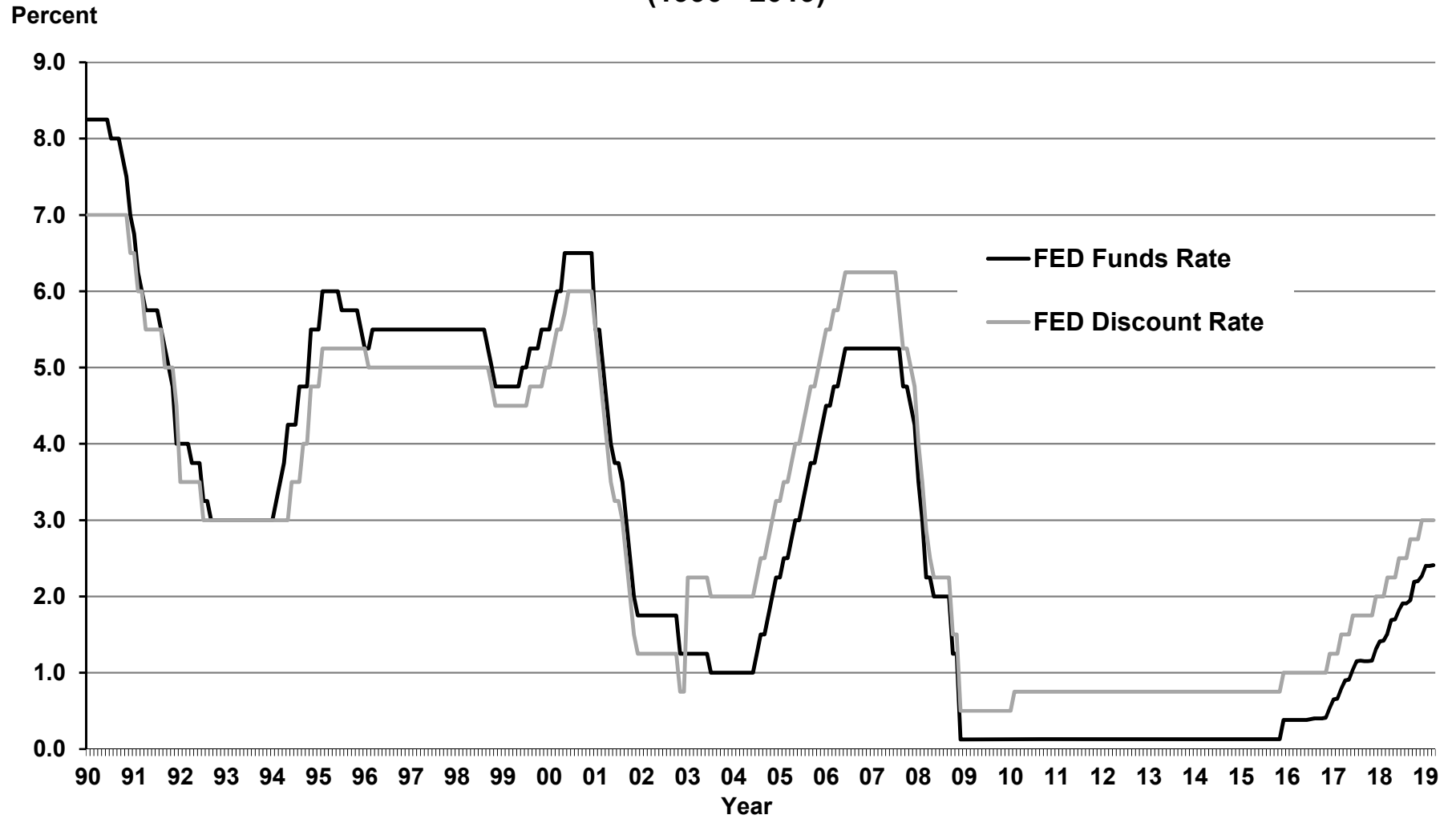
Federal Reserve			Federal Reserve		
Date	Discount Rate	Funds Rate	Date	Discount Rate	Funds Rate
07/13/90		8.00%	06/27/01	3.25%	3.75%
10/29/90		7.75%	08/21/01	3.00%	3.50%
11/13/90		7.50%	09/17/01	2.50%	3.00%
12/07/90		7.25%	10/02/01	2.00%	2.50%
12/18/90		7.00%	11/06/01	1.50%	2.00%
12/19/90	6.50%		12/11/01	1.25%	1.75%
01/09/91		6.75%	11/06/02	0.75%	1.25%
02/01/91	6.00%	6.25%	01/09/03	2.25% *	1.25%
03/08/91		6.00%	06/25/03	2.00%	1.00%
04/30/91	5.50%	5.75%	06/30/04	2.25%	1.25%
08/06/91		5.50%	08/10/04	2.50%	1.50%
09/13/91	5.00%	5.25%	09/21/04	2.75%	1.75%
10/31/91		5.00%	11/10/04	3.00%	2.00%
11/06/91	4.50%	4.75%	12/14/04	3.25%	2.25%
12/06/91		4.50%	02/02/05	3.50%	2.50%
12/20/91	3.50%	4.00%	03/22/05	3.75%	2.75%
04/09/92		3.75%	05/03/05	4.00%	3.00%
07/02/92	3.00%	3.25%	06/30/05	4.25%	3.25%
09/04/92		3.00%	08/09/05	4.50%	3.50%
01/01/93			09/20/05	4.75%	3.75%
12/31/93	No Changes	No Changes	11/01/05	5.00%	4.00%
02/04/94		3.25%	12/13/05	5.25%	4.25%
03/22/94		3.50%	01/31/06	5.50%	4.50%
04/18/94		3.75%	03/28/06	5.75%	4.75%
05/17/94	3.50%	4.25%	05/10/06	6.00%	5.00%
08/16/94	4.00%	4.75%	06/29/06	6.25%	5.25%
11/15/94	4.75%	5.50%	08/17/07	5.75%	5.25%
02/01/95	5.25%	6.00%	09/18/07	5.25%	4.75%
07/06/95		5.75%	10/31/07	5.00%	4.50%
12/19/95		5.50%	12/11/07	4.75%	4.25%
01/31/96	5.00%	5.25%	01/22/08	4.00%	3.50%
03/25/97		5.50%	01/30/08	3.50%	3.00%
12/12/97	5.00%		03/16/08	3.25%	
01/09/98	5.00%		03/18/08	2.50%	2.25%
03/06/98	5.00%		04/30/08	2.25%	2.00%
09/29/98		5.25%	10/08/08	1.75%	1.50%
10/15/98	4.75%	5.00%	10/28/08	1.25%	1.00%
11/17/98	4.50%	4.75%	12/16/08	0.50%	0% - .25%
06/30/99	4.50%	5.00%	02/19/10	0.75%	
08/24/99	4.75%	5.25%	12/17/15	1.00%	.25% - .50%
11/16/99	5.00%	5.50%	12/15/16	1.25%	.50% - .75%
02/02/00	5.25%	5.75%	03/16/17	1.50%	.75% - 1.00%
03/21/00	5.50%	6.00%	06/15/17	1.75%	1.00% - 1.25%
05/19/00	6.00%	6.50%	12/12/17	2.00%	1.25% - 1.50%
01/03/01	5.75%	6.00%	03/21/18	2.25%	1.50% - 1.75%
01/04/01	5.50%	6.00%	06/14/18	2.50%	1.75% - 2.00%
01/31/01	5.00%	5.50%	09/27/18	2.75%	2.00% - 2.25%
03/20/01	4.50%	5.00%	12/20/18	3.00%	2.00% - 2.50%
04/18/01	4.00%	4.50%			
05/15/01	3.50%	4.00%			

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

Source: Federal Reserve Discount rate <https://www.frbdiscountwindow.org/Pages/Discount-Rates/Historical-Discount-Rates.aspx>
Federal Reserve Funds rate <https://fred.stlouisfed.org/series/FEDFUNDS>

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

Federal Reserve Discount Rates and Federal Funds Rates (1990 - 2019)

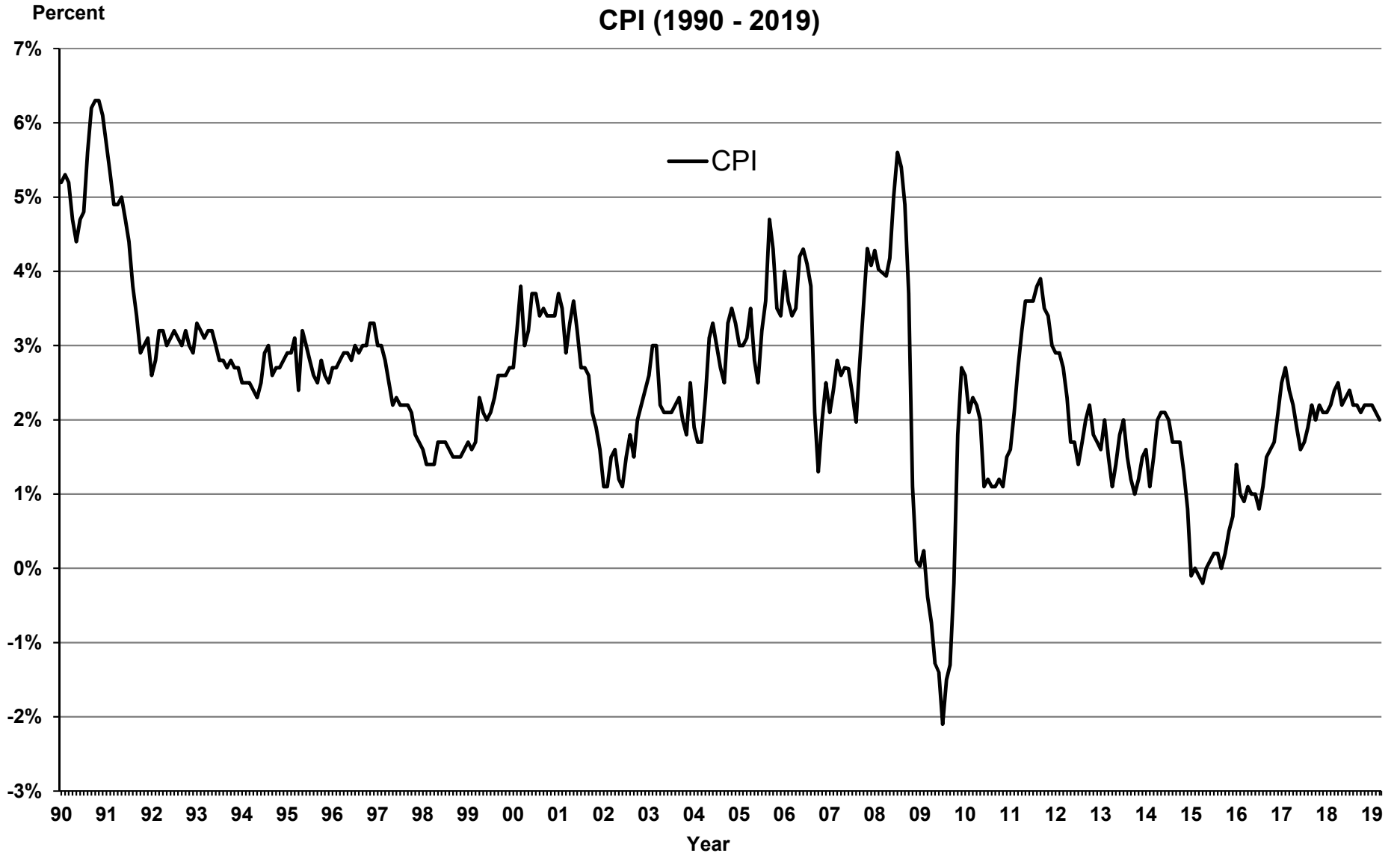


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Consumer Price Index (CPI) Rate of Inflation									
Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1988	4.10	Jan 1994	2.50	Jan 2000	2.70	Jan 2006	4.00	Jan 2012	2.90
Feb	3.90	Feb	2.50	Feb	3.20	Feb	3.60	Feb	2.90
Mar	3.80	Mar	2.50	Mar	3.70	Mar	3.40	Mar	2.70
Apr	4.00	Apr	2.40	Apr	3.00	Apr	3.50	Apr	2.30
May	4.00	May	2.30	May	3.20	May	4.20	May	1.70
Jun	4.00	Jun	2.50	Jun	3.70	June	4.30	Jun	1.70
Jul	4.10	Jul	2.90	Jul	3.70	July	4.10	Jul	1.40
Aug	4.10	Aug	3.00	Aug	3.40	Aug	3.80	Aug	1.70
Sep	4.20	Sep	2.60	Sep	3.50	Sep	2.10	Sep	2.00
Oct	4.30	Oct	2.70	Oct	3.40	Oct	1.30	Oct	2.20
Nov	4.20	Nov	2.70	Nov	3.40	Nov	2.00	Nov	1.80
Dec	4.40	Dec	2.80	Dec	3.40	Dec	2.50	Dec	1.70
Jan 1989	4.50	Jan 1995	2.90	Jan 2001	3.70	Jan 2007	2.10	Jan 2013	1.60
Feb	4.60	Feb	2.90	Feb	3.50	Feb	2.40	Feb	2.00
Mar	4.90	Mar	3.10	Mar	2.90	Mar	2.80	Mar	1.50
Apr	5.00	Apr	2.40	Apr	3.30	Apr	2.60	Apr	1.10
May	5.30	May	3.20	May	3.60	May	2.70	May	1.40
Jun	5.20	Jun	3.00	Jun	3.20	Jun	2.70	Jun	1.80
Jul	5.10	Jul	2.80	Jul	2.70	Jul	2.40	Jul	2.00
Aug	4.60	Aug	2.60	Aug	2.70	Aug	2.00	Aug	1.50
Sep	4.40	Sep	2.50	Sep	2.60	Sep	2.80	Sept	1.20
Oct	4.60	Oct	2.80	Oct	2.10	Oct	3.50	Oct	1.00
Nov	4.70	Nov	2.60	Nov	1.90	Nov	4.30	Nov	1.20
Dec	4.60	Dec	2.50	Dec	1.60	Dec	4.10	Dec	1.50
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 2019	2.20
								Feb	2.10
								Mar	2.20

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_nr.htm

Union Electric Company
Case No. GR-2019-0077



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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	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	8.16	8.33	8.47	8.50	0.17	0.31	0.34	0.14	0.17	0.03
Aug-90	8.06	8.44	8.75	8.86	0.38	0.69	0.80	0.32	0.43	0.11
Sep-90	8.08	8.51	8.89	9.03	0.43	0.81	0.95	0.38	0.52	0.14
Oct-90	7.88	8.33	8.72	8.86	0.45	0.84	0.98	0.39	0.53	0.14
Nov-90	7.60	8.02	8.39	8.54	0.42	0.79	0.94	0.37	0.52	0.15
Dec-90	7.31	7.73	8.08	8.24	0.41	0.76	0.92	0.35	0.51	0.16
Jan-91	7.13	7.70	8.09	8.27	0.57	0.97	1.14	0.39	0.57	0.18
Feb-91	6.87	7.47	7.85	8.03	0.61	0.99	1.17	0.38	0.56	0.18
Mar-91	7.10	7.77	8.11	8.29	0.67	1.01	1.19	0.34	0.52	0.18
Apr-91	6.95	7.70	8.04	8.21	0.75	1.09	1.26	0.34	0.51	0.17
May-91	6.78	7.70	8.07	8.27	0.92	1.28	1.48	0.37	0.57	0.20
Jun-91	6.96	7.94	8.28	8.47	0.98	1.33	1.52	0.35	0.53	0.19
Jul-91	6.92	7.91	8.27	8.45	0.99	1.36	1.53	0.36	0.54	0.18
Aug-91	6.43	7.43	7.90	8.14	0.99	1.47	1.71	0.48	0.72	0.24
Sep-91	6.18	7.14	7.65	7.95	0.95	1.47	1.77	0.51	0.81	0.30
Oct-91	5.91	6.87	7.53	7.93	0.96	1.62	2.02	0.66	1.06	0.40
Nov-91	5.56	6.62	7.42	7.92	1.06	1.86	2.36	0.80	1.30	0.50
Dec-91	5.03	6.19	7.09	7.70	1.16	2.06	2.68	0.90	1.52	0.61
Jan-92	4.96	6.24	7.03	7.58	1.28	2.07	2.62	0.79	1.34	0.55
Feb-92	5.21	6.58	7.34	7.85	1.37	2.13	2.64	0.76	1.28	0.52
Mar-92	5.69	6.95	7.54	7.97	1.26	1.86	2.28	0.60	1.02	0.43
Apr-92	5.34	6.78	7.48	7.96	1.44	2.14	2.62	0.70	1.18	0.48
May-92	5.23	6.69	7.39	7.89	1.47	2.17	2.67	0.70	1.20	0.50
Jun-92	5.05	6.48	7.26	7.84	1.43	2.21	2.79	0.78	1.36	0.58
Jul-92	4.36	5.84	6.84	7.60	1.48	2.49	3.24	1.01	1.76	0.75
Aug-92	4.19	5.60	6.59	7.39	1.40	2.39	3.20	0.99	1.79	0.80
Sep-92	3.89	5.38	6.42	7.34	1.49	2.52	3.45	1.04	1.96	0.93

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Oct-92	4.08	5.60	6.59	7.53	1.52	2.51	3.45	0.99	1.93	0.94
Nov-92	4.58	6.04	6.87	7.61	1.46	2.29	3.03	0.84	1.57	0.73
Dec-92	4.67	6.08	6.77	7.44	1.40	2.10	2.76	0.69	1.36	0.67
Jan-93	4.39	5.83	6.60	7.34	1.44	2.21	2.95	0.77	1.51	0.74
Feb-93	4.10	5.43	6.26	7.09	1.33	2.16	2.99	0.83	1.66	0.83
Mar-93	3.95	5.19	5.98	6.82	1.25	2.03	2.87	0.78	1.63	0.85
Apr-93	3.84	5.13	5.97	6.85	1.30	2.13	3.02	0.84	1.72	0.88
May-93	3.98	5.20	6.04	6.92	1.22	2.06	2.94	0.84	1.72	0.88
Jun-93	4.16	5.22	5.96	6.81	1.05	1.80	2.64	0.75	1.59	0.84
Jul-93	4.07	5.09	5.81	6.63	1.02	1.73	2.55	0.71	1.53	0.82
Aug-93	4.00	5.03	5.68	6.32	1.02	1.68	2.32	0.65	1.30	0.65
Sep-93	3.85	4.73	5.36	6.00	0.89	1.51	2.15	0.63	1.26	0.64
Oct-93	3.87	4.71	5.33	5.94	0.83	1.46	2.06	0.63	1.23	0.61
Nov-93	4.16	5.06	5.72	6.21	0.91	1.57	2.05	0.66	1.15	0.49
Dec-93	4.21	5.15	5.77	6.25	0.93	1.56	2.04	0.63	1.11	0.48
Jan-94	4.14	5.09	5.75	6.29	0.95	1.61	2.15	0.66	1.20	0.54
Feb-94	4.47	5.40	5.97	6.49	0.92	1.50	2.02	0.58	1.10	0.52
Mar-94	5.00	5.94	6.48	6.91	0.95	1.49	1.91	0.54	0.97	0.42
Apr-94	5.55	6.52	6.97	7.27	0.97	1.42	1.72	0.45	0.74	0.30
May-94	5.97	6.78	7.18	7.41	0.81	1.22	1.44	0.40	0.63	0.23
Jun-94	5.93	6.70	7.10	7.40	0.76	1.17	1.46	0.41	0.70	0.29
Jul-94	6.13	6.91	7.30	7.58	0.78	1.17	1.45	0.39	0.67	0.28
Aug-94	6.18	6.88	7.24	7.49	0.70	1.06	1.31	0.36	0.61	0.25
Sep-94	6.39	7.08	7.46	7.71	0.69	1.06	1.32	0.37	0.63	0.26
Oct-94	6.73	7.40	7.74	7.94	0.67	1.02	1.21	0.34	0.53	0.19
Nov-94	7.15	7.72	7.96	8.08	0.57	0.81	0.93	0.24	0.36	0.13
Dec-94	7.59	7.78	7.81	7.87	0.19	0.22	0.28	0.04	0.10	0.06
Jan-95	7.51	7.76	7.78	7.85	0.25	0.27	0.34	0.02	0.09	0.07
Feb-95	7.11	7.37	7.47	7.61	0.25	0.36	0.50	0.10	0.25	0.14
Mar-95	6.78	7.05	7.20	7.45	0.27	0.43	0.67	0.16	0.40	0.24
Apr-95	6.57	6.86	7.06	7.36	0.29	0.49	0.79	0.20	0.50	0.30
May-95	6.17	6.41	6.63	6.95	0.24	0.46	0.78	0.22	0.54	0.32
Jun-95	5.72	5.93	6.17	6.57	0.21	0.45	0.86	0.24	0.64	0.41

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jul-95	5.78	6.01	6.28	6.72	0.23	0.50	0.94	0.27	0.71	0.44
Aug-95	5.98	6.24	6.49	6.86	0.26	0.51	0.88	0.24	0.62	0.37
Sep-95	5.81	6.00	6.20	6.55	0.20	0.39	0.74	0.20	0.55	0.35
Oct-95	5.70	5.86	6.04	6.37	0.17	0.35	0.68	0.18	0.51	0.33
Nov-95	5.48	5.69	5.93	6.26	0.22	0.45	0.78	0.24	0.57	0.33
Dec-95	5.32	5.51	5.71	6.06	0.19	0.39	0.74	0.20	0.55	0.35
Jan-96	5.11	5.36	5.65	6.05	0.25	0.54	0.94	0.29	0.69	0.40
Feb-96	5.03	5.38	5.81	6.24	0.35	0.78	1.22	0.43	0.86	0.44
Mar-96	5.66	5.97	6.27	6.60	0.31	0.61	0.94	0.30	0.64	0.34
Apr-96	5.96	6.30	6.51	6.79	0.34	0.55	0.84	0.21	0.49	0.28
May-96	6.10	6.48	6.74	6.93	0.39	0.64	0.83	0.25	0.44	0.19
Jun-96	6.30	6.69	6.91	7.06	0.39	0.62	0.76	0.22	0.37	0.15
Jul-96	6.27	6.64	6.87	7.03	0.37	0.60	0.76	0.23	0.40	0.17
Aug-96	6.03	6.39	6.64	6.84	0.36	0.61	0.81	0.25	0.45	0.21
Sep-96	6.23	6.60	6.83	7.03	0.36	0.60	0.79	0.23	0.43	0.19
Oct-96	5.91	6.27	6.53	6.81	0.36	0.62	0.90	0.26	0.54	0.28
Nov-96	5.70	5.97	6.20	6.48	0.27	0.50	0.78	0.23	0.51	0.28
Dec-96	5.78	6.07	6.30	6.55	0.29	0.52	0.77	0.23	0.48	0.25
Jan-97	6.01	6.33	6.58	6.83	0.33	0.57	0.82	0.25	0.49	0.25
Feb-97	5.90	6.20	6.42	6.69	0.30	0.52	0.79	0.22	0.49	0.27
Mar-97	6.22	6.54	6.69	6.93	0.32	0.47	0.71	0.16	0.40	0.24
Apr-97	6.45	6.76	6.89	7.09	0.31	0.44	0.64	0.13	0.33	0.21
May-97	6.28	6.57	6.71	6.94	0.29	0.43	0.66	0.14	0.37	0.22
Jun-97	6.09	6.38	6.49	6.77	0.28	0.40	0.68	0.12	0.40	0.28
Jul-97	5.89	6.12	6.22	6.51	0.23	0.33	0.62	0.10	0.39	0.29
Aug-97	5.94	6.16	6.30	6.58	0.22	0.36	0.64	0.14	0.42	0.28
Sep-97	5.88	6.11	6.21	6.50	0.22	0.33	0.61	0.10	0.39	0.29
Oct-97	5.77	5.93	6.03	6.33	0.16	0.26	0.55	0.10	0.40	0.30
Nov-97	5.71	5.80	5.88	6.11	0.09	0.16	0.40	0.07	0.31	0.23
Dec-97	5.72	5.77	5.81	5.99	0.06	0.09	0.28	0.04	0.22	0.18
Jan-98	5.36	5.42	5.54	5.81	0.06	0.19	0.45	0.13	0.40	0.27
Feb-98	5.42	5.49	5.57	5.89	0.07	0.16	0.47	0.08	0.40	0.32
Mar-98	5.56	5.61	5.65	5.95	0.05	0.09	0.39	0.04	0.34	0.30

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Apr-98	5.56	5.61	5.64	5.92	0.05	0.07	0.36	0.03	0.31	0.29
May-98	5.59	5.63	5.65	5.93	0.03	0.06	0.33	0.02	0.30	0.27
Jun-98	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	5.46	5.46	5.46	5.68	0.00	0.00	0.22	0.00	0.22	0.22
Aug-98	5.27	5.27	5.34	5.54	0.01	0.07	0.27	0.07	0.27	0.20
Sep-98	4.67	4.62	4.81	5.20	<u>-0.04</u>	0.14	0.54	0.18	0.58	0.40
Oct-98	4.09	4.18	4.53	5.01	0.09	0.44	0.92	0.35	0.83	0.48
Nov-98	4.54	4.54	4.83	5.25	0.00	0.29	0.71	0.29	0.71	0.42
Dec-98	4.51	4.45	4.65	5.06	<u>-0.06</u>	0.14	0.55	0.19	0.61	0.41
Jan-99	4.62	4.60	4.72	5.16	<u>-0.01</u>	0.11	0.54	0.12	0.56	0.44
Feb-99	4.88	4.91	5.00	5.37	0.04	0.12	0.49	0.08	0.45	0.37
Mar-99	5.05	5.14	5.23	5.58	0.09	0.18	0.53	0.09	0.44	0.35
Apr-99	4.98	5.08	5.18	5.55	0.10	0.21	0.57	0.11	0.47	0.36
May-99	5.25	5.44	5.54	5.81	0.18	0.29	0.55	0.10	0.37	0.27
Jun-99	5.62	5.81	5.90	6.04	0.19	0.28	0.42	0.09	0.23	0.14
Jul-99	5.55	5.68	5.79	5.98	0.12	0.24	0.43	0.11	0.30	0.19
Aug-99	5.68	5.84	5.94	6.07	0.16	0.26	0.39	0.10	0.23	0.13
Sep-99	5.66	5.80	5.92	6.07	0.14	0.25	0.41	0.11	0.27	0.16
Oct-99	5.86	6.03	6.11	6.26	0.17	0.25	0.40	0.08	0.23	0.15
Nov-99	5.86	5.97	6.03	6.15	0.11	0.17	0.28	0.06	0.18	0.11
Dec-99	6.10	6.19	6.28	6.35	0.08	0.17	0.25	0.09	0.17	0.08
Jan-00	6.44	6.58	6.66	6.63	0.14	0.22	0.19	0.08	0.05	<u>-0.04</u>
Feb-00	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	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	6.40	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	6.81	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	6.48	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	6.34	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	6.23	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	6.08	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	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	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	5.35	5.17	5.24	5.49	<u>-0.18</u>	<u>-0.11</u>	0.14	0.07	0.32	0.25

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jan-01	4.76	4.86	5.16	5.54	0.10	0.40	0.78	0.30	0.68	0.38
Feb-01	4.66	4.89	5.10	5.45	0.23	0.44	0.80	0.21	0.57	0.36
Mar-01	4.34	4.64	4.89	5.34	0.30	0.54	1.00	0.24	0.70	0.45
Apr-01	4.23	4.76	5.14	5.65	0.53	0.91	1.41	0.38	0.88	0.51
May-01	4.26	4.93	5.39	5.78	0.67	1.13	1.52	0.46	0.85	0.39
Jun-01	4.08	4.81	5.28	5.67	0.73	1.20	1.59	0.48	0.86	0.39
Jul-01	4.04	4.76	5.24	5.61	0.72	1.20	1.57	0.47	0.85	0.38
Aug-01	3.76	4.57	4.97	5.48	0.82	1.21	1.73	0.40	0.91	0.51
Sep-01	3.12	4.12	4.73	5.48	1.00	1.61	2.36	0.62	1.37	0.75
Oct-01	2.73	3.91	4.57	5.32	1.18	1.84	2.59	0.66	1.41	0.75
Nov-01	2.78	3.97	4.65	5.12	1.19	1.87	2.34	0.68	1.15	0.47
Dec-01	3.11	4.39	5.09	5.48	1.28	1.98	2.37	0.70	1.09	0.39
Jan-02	3.03	4.34	5.04	5.45	1.31	2.01	2.42	0.70	1.11	0.41
Feb-02	3.02	4.30	4.91	5.40	1.28	1.90	2.39	0.61	1.10	0.49
Mar-02	3.56	4.74	5.28	0	1.18	1.73		0.55		
Apr-02	3.42	4.65	5.21	0	1.22	1.79		0.56		
May-02	3.26	4.49	5.16	0	1.23	1.90		0.67		
Jun-02	2.99	4.19	4.93	0	1.19	1.93		0.74		
Jul-02	2.56	3.81	4.65	0	1.25	2.10		0.85		
Aug-02	2.13	3.29	4.26	0	1.16	2.12		0.96		
Sep-02	2.00	2.94	3.87	0	0.93	1.87		0.93		
Oct-02	1.91	2.95	3.94	0	1.03	2.03		1.00		
Nov-02	1.92	3.05	4.05	0	1.13	2.13		0.99		
Dec-02	1.84	3.03	4.03	0	1.20	2.20		1.00		
Jan-03	1.74	3.05	4.05	0	1.31	2.31		1.00		
Feb-03	1.63	2.90	3.90	0	1.27	2.27		1.00		
Mar-03	1.57	2.78	3.81	0	1.21	2.23		1.02		
Apr-03	1.62	2.93	3.96	0	1.31	2.34		1.03		
May-03	1.42	2.52	3.57	0	1.10	2.15		1.05		
Jun-03	1.23	2.27	3.33	0	1.04	2.11		1.07		
Jul-03	1.47	2.87	3.98	0	1.40	2.50		1.10		
Aug-03	1.86	3.37	4.45	0	1.51	2.58		1.08		
Sep-03	1.71	3.18	4.27	0	1.48	2.57		1.09		

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Oct-03	1.75	3.19	4.29	0	1.44	2.54		1.10		
Nov-03	1.93	3.29	4.30	0	1.36	2.37		1.01		
Dec-03	1.91	3.27	4.27	0	1.36	2.36		1.00		
Jan-04	1.76	3.12	4.15	0	1.36	2.39		1.03		
Feb-04	1.74	3.07	4.08	0	1.33	2.34		1.02		
Mar-04	1.58	2.79	3.83	0	1.21	2.25		1.04		
Apr-04	2.07	3.39	4.35	0	1.32	2.28		0.96		
May-04	2.53	3.85	4.72	0	1.32	2.18		0.87		
Jun-04	2.76	3.93	4.73	0	1.17	1.97		0.80		
Jul-04	2.64	3.69	4.50	0	1.05	1.86		0.81		
Aug-04	2.51	3.47	4.28	0	0.97	1.77		0.81		
Sep-04	2.53	3.36	4.13	0	0.83	1.60		0.77		
Oct-04	2.58	3.35	4.10	0	0.76	1.51		0.75		
Nov-04	2.85	3.53	4.19	0	0.67	1.34		0.67		
Dec-04	3.01	3.60	4.23	0	0.59	1.22		0.63		
Jan-05	3.22	3.71	4.22	0	0.48	1.00		0.51		
Feb-05	3.38	3.77	4.17	0	0.38	0.78		0.40		
Mar-05	3.73	4.17	4.50	0	0.44	0.77		0.33		
Apr-05	3.65	4.00	4.34	0	0.34	0.69		0.34		
May-05	3.64	3.85	4.14	0	0.21	0.50		0.29		
Jun-05	3.64	3.77	4.00	0	0.13	0.36		0.23		
Jul-05	3.87	3.98	4.18	0	0.11	0.31		0.20		
Aug-05	4.04	4.12	4.26	0	0.08	0.22		0.14		
Sep-05	3.95	4.01	4.20	0	0.06	0.25		0.19		
Oct-05	4.27	4.33	4.46	0	0.06	0.19		0.14		
Nov-05	4.42	4.45	4.54	0	0.04	0.12		0.08		
Dec-05	4.40	4.39	4.47	0	<u>-0.01</u>	0.06		0.07		
Jan-06	4.40	4.35	4.42	0	<u>-0.05</u>	0.02		0.07		
Feb-06	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	4.73	4.72	4.72	4.73	<u>-0.02</u>	<u>-0.01</u>	0.00	0.01	0.02	0.01
Apr-06	4.89	4.90	4.99	5.06	0.01	0.10	0.17	0.09	0.16	0.07
May-06	4.97	5.00	5.11	5.20	0.03	0.14	0.23	0.11	0.20	0.09
Jun-06	5.12	5.07	5.11	5.15	<u>-0.05</u>	<u>-0.02</u>	0.03	0.04	0.09	0.05

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jul-06	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	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	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	4.80	4.69	4.73	4.85	<u>-0.11</u>	<u>-0.07</u>	0.06	0.04	0.17	0.13
Nov-06	4.74	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	4.67	4.53	4.56	4.68	<u>-0.14</u>	<u>-0.11</u>	0.01	0.03	0.15	0.12
Jan-07	4.88	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	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	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	4.67	4.59	4.69	4.87	<u>-0.07</u>	0.03	0.20	0.10	0.27	0.17
May-07	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	4.98	5.03	5.10	5.20	0.05	0.12	0.22	0.08	0.18	0.10
Jul-07	4.82	4.88	5.00	5.11	0.07	0.19	0.29	0.12	0.22	0.10
Aug-07	4.31	4.43	4.67	4.93	0.12	0.36	0.62	0.24	0.50	0.26
Sep-07	4.01	4.20	4.52	4.79	0.19	0.51	0.78	0.32	0.59	0.27
Oct-07	3.97	4.20	4.53	4.77	0.23	0.56	0.81	0.33	0.58	0.25
Nov-07	3.34	3.67	4.15	4.52	0.33	0.81	1.18	0.48	0.85	0.37
Dec-07	3.12	3.49	4.10	4.53	0.37	0.98	1.41	0.61	1.04	0.43
Jan-08	2.48	2.98	3.74	4.33	0.50	1.27	1.85	0.76	1.35	0.59
Feb-08	1.97	2.78	3.74	4.52	0.81	1.76	2.54	0.96	1.74	0.78
Mar-08	1.62	2.48	3.51	4.39	0.87	1.89	2.78	1.03	1.91	0.88
Apr-08	2.05	2.84	3.68	4.44	0.79	1.63	2.40	0.83	1.60	0.77
May-08	2.45	3.15	3.88	4.60	0.71	1.43	2.15	0.73	1.44	0.72
Jun-08	2.77	3.49	4.10	4.69	0.71	1.33	1.92	0.61	1.20	0.59
Jul-08	2.57	3.30	4.01	4.57	0.73	1.43	2.00	0.70	1.27	0.56
Aug-08	2.42	3.14	3.89	4.50	0.72	1.47	2.08	0.74	1.36	0.62
Sep-08	2.08	2.88	3.69	4.27	0.81	1.61	2.19	0.80	1.38	0.58
Oct-08	1.61	2.73	3.81	4.17	1.11	2.20	2.56	1.09	1.45	0.36
Nov-08	1.21	2.29	3.53	4.00	1.08	2.31	2.79	1.24	1.71	0.48
Dec-08	0.82	1.52	2.42	2.87	0.70	1.60	2.05	0.89	1.35	0.45
Jan-09	0.81	1.60	2.52	3.13	0.79	1.71	2.32	0.92	1.53	0.61
Feb-09	0.98	1.87	2.87	3.59	0.90	1.89	2.61	1.00	1.72	0.72
Mar-09	0.93	1.82	2.82	3.64	0.88	1.89	2.71	1.00	1.83	0.82

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Apr-09	0.93	1.86	2.93	3.76	0.93	2.00	2.83	1.07	1.90	0.83
May-09	0.93	2.13	3.29	4.23	1.20	2.36	3.30	1.16	2.09	0.93
Jun-09	1.18	2.71	3.72	4.52	1.52	2.54	3.33	1.02	1.81	0.79
Jul-09	1.02	2.46	3.56	4.41	1.44	2.54	3.39	1.10	1.94	0.84
Aug-09	1.12	2.57	3.59	4.37	1.46	2.47	3.26	1.02	1.80	0.78
Sep-09	0.96	2.37	3.40	4.19	1.41	2.45	3.23	1.03	1.82	0.78
Oct-09	0.95	2.33	3.39	4.19	1.38	2.44	3.24	1.05	1.86	0.80
Nov-09	0.80	2.23	3.40	4.31	1.43	2.60	3.51	1.17	2.08	0.91
Dec-09	0.87	2.34	3.59	4.49	1.47	2.72	3.62	1.25	2.15	0.90
Jan-10	0.93	2.48	3.73	4.60	1.56	2.80	3.68	1.25	2.12	0.87
Feb-10	0.86	2.36	3.69	4.62	1.51	2.83	3.76	1.33	2.26	0.93
Mar-10	0.96	2.43	3.73	4.64	1.47	2.77	3.69	1.29	2.21	0.92
Apr-10	1.06	2.58	3.85	4.69	1.52	2.79	3.63	1.27	2.11	0.85
May-10	0.83	2.18	3.42	4.29	1.35	2.59	3.46	1.24	2.11	0.87
Jun-10	0.72	2.00	3.20	4.13	1.27	2.48	3.40	1.21	2.13	0.92
Jul-10	0.62	1.76	3.01	3.99	1.15	2.39	3.38	1.25	2.23	0.98
Aug-10	0.52	1.47	2.70	3.80	0.95	2.18	3.28	1.23	2.34	1.10
Sep-10	0.48	1.41	2.65	3.77	0.93	2.17	3.29	1.24	2.36	1.13
Oct-10	0.38	1.18	2.54	3.87	0.81	2.16	3.50	1.36	2.69	1.33
Nov-10	0.45	1.35	2.76	4.19	0.90	2.31	3.73	1.41	2.84	1.42
Dec-10	0.62	1.93	3.29	4.42	1.32	2.67	3.80	1.36	2.48	1.13
Jan-11	0.61	1.99	3.39	4.52	1.38	2.78	3.91	1.40	2.53	1.13
Feb-11	0.77	2.26	3.58	4.65	1.49	2.80	3.88	1.32	2.39	1.08
Mar-11	0.70	2.11	3.41	4.51	1.42	2.72	3.82	1.30	2.40	1.10
Apr-11	0.73	2.17	3.46	4.50	1.43	2.72	3.77	1.29	2.33	1.05
May-11	0.56	1.84	3.17	4.29	1.29	2.61	3.74	1.33	2.45	1.12
Jun-11	0.41	1.58	3.00	4.23	1.17	2.59	3.82	1.42	2.65	1.23
Jul-11	0.41	1.54	3.00	4.27	1.13	2.60	3.86	1.46	2.73	1.27
Aug-11	0.23	1.02	2.30	3.65	0.79	2.07	3.42	1.28	2.63	1.35
Sep-11	0.21	0.90	1.98	3.18	0.69	1.76	2.97	1.07	2.28	1.21
Oct-11	0.28	1.06	2.15	3.13	0.78	1.87	2.85	1.09	2.07	0.98
Nov-11	0.25	0.91	2.01	3.02	0.65	1.76	2.76	1.11	2.11	1.00
Dec-11	0.26	0.89	1.98	2.98	0.63	1.72	2.73	1.09	2.09	1.00

Union Electric Company
Case No. GR-2019-0077

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jan-12	0.24	0.84	1.97	3.03	0.59	1.73	2.79	1.13	2.19	1.06
Feb-12	0.28	0.83	1.97	3.11	0.55	1.69	2.83	1.14	2.28	1.14
Mar-12	0.34	1.02	2.17	3.28	0.67	1.83	2.94	1.16	2.26	1.11
Apr-12	0.29	0.89	2.05	3.18	0.60	1.76	2.89	1.16	2.29	1.13
May-12	0.29	0.76	1.80	2.93	0.48	1.52	2.65	1.04	2.17	1.13
Jun-12	0.29	0.71	1.62	2.70	0.42	1.33	2.41	0.91	1.99	1.08
Jul-12	0.25	0.62	1.53	2.59	0.37	1.28	2.34	0.91	1.97	1.06
Aug-12	0.27	0.71	1.68	2.77	0.45	1.41	2.50	0.96	2.06	1.09
Sep-12	0.26	0.67	1.72	2.88	0.41	1.47	2.63	1.05	2.21	1.16
Oct-12	0.28	0.71	1.75	2.90	0.43	1.47	2.62	1.04	2.19	1.15
Nov-12	0.27	0.67	1.65	2.80	0.40	1.39	2.54	0.99	2.14	1.15
Dec-12	0.26	0.70	1.72	2.88	0.44	1.46	2.63	1.02	2.19	1.16
Jan-13	0.27	0.81	1.91	3.08	0.54	1.65	2.82	1.11	2.28	1.17
Feb-13	0.27	0.85	1.98	3.17	0.58	1.72	2.90	1.14	2.32	1.18
Mar-13	0.26	0.82	1.96	3.16	0.56	1.70	2.91	1.14	2.34	1.21
Apr-13	0.23	0.71	1.76	2.93	0.48	1.53	2.70	1.05	2.22	1.17
May-13	0.25	0.84	1.93	3.11	0.59	1.68	2.86	1.09	2.27	1.18
Jun-13	0.33	1.20	2.30	3.40	0.87	1.97	3.07	1.10	2.20	1.10
Jul-13	0.34	1.40	2.58	3.61	1.06	2.24	3.26	1.18	2.20	1.02
Aug-13	0.36	1.52	2.74	3.76	1.16	2.38	3.40	1.22	2.24	1.02
Sep-13	0.40	1.60	2.81	3.79	1.19	2.41	3.38	1.21	2.19	0.98
Oct-13	0.34	1.37	2.62	3.68	1.03	2.28	3.34	1.25	2.31	1.06
Nov-13	0.30	1.37	2.72	3.80	1.07	2.41	3.50	1.35	2.43	1.08
Dec-13	0.34	1.58	2.90	3.89	1.24	2.56	3.55	1.33	2.31	0.99
Jan-14	0.39	1.65	2.86	3.77	1.25	2.46	3.38	1.21	2.12	0.91
Feb-14	0.33	1.52	2.71	3.66	1.19	2.38	3.34	1.19	2.15	0.95
Mar-14	0.40	1.64	2.72	3.62	1.24	2.32	3.22	1.08	1.98	0.90
Apr-14	0.42	1.70	2.71	3.52	1.28	2.29	3.10	1.00	1.82	0.81
May-14	0.39	1.59	2.56	3.39	1.20	2.17	3.00	0.97	1.80	0.83
Jun-14	0.45	1.68	2.60	3.42	1.23	2.15	2.97	0.92	1.74	0.82
Jul-14	0.51	1.70	2.54	3.33	1.19	2.04	2.83	0.84	1.63	0.79
Aug-14	0.47	1.63	2.42	3.20	1.16	1.95	2.73	0.79	1.57	0.78
Sep-14	0.57	1.77	2.53	3.26	1.21	1.97	2.69	0.76	1.49	0.73

**Union Electric Company
Case No. GR-2019-0077**

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	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Oct-14	0.45	1.55	2.30	3.04	1.10	1.86	2.59	0.76	1.49	0.74
Nov-14	0.53	1.62	2.33	3.04	1.09	1.80	2.51	0.71	1.42	0.71
Dec-14	0.64	1.64	2.21	2.83	1.00	1.57	2.20	0.57	1.19	0.63
Jan-15	0.55	1.37	1.88	2.46	0.82	1.33	1.90	0.51	1.08	0.57
Feb-15	0.62	1.47	1.98	2.57	0.85	1.36	1.95	0.50	1.09	0.59
Mar-15	0.64	1.52	2.04	2.63	0.88	1.40	1.99	0.52	1.11	0.58
Apr-15	0.54	1.35	1.94	2.59	0.81	1.40	2.05	0.58	1.23	0.65
May-15	0.61	1.54	2.20	2.96	0.93	1.59	2.35	0.66	1.42	0.76
Jun-15	0.69	1.68	2.36	3.11	1.00	1.68	2.42	0.68	1.43	0.75
Jul-15	0.67	1.63	2.32	3.07	0.96	1.66	2.40	0.69	1.43	0.74
Aug-15	0.70	1.54	2.17	2.86	0.84	1.47	2.16	0.63	1.31	0.69
Sep-15	0.71	1.49	2.17	2.95	0.78	1.46	2.24	0.68	1.46	0.78
Oct-15	0.64	1.39	2.07	2.89	0.74	1.43	2.24	0.68	1.50	0.82
Nov-15	0.88	1.67	2.26	3.03	0.79	1.38	2.15	0.59	1.36	0.77
Dec-15	0.98	1.70	2.24	2.97	0.72	1.26	1.99	0.54	1.27	0.73
Jan-16	0.90	1.52	2.09	2.86	0.62	1.19	1.96	0.57	1.34	0.77
Feb-16	0.73	1.22	1.78	2.62	0.49	1.05	1.89	0.56	1.40	0.84
Mar-16	0.88	1.38	1.89	2.68	0.50	1.01	1.81	0.51	1.31	0.80
Apr-16	0.77	1.26	1.81	2.62	0.49	1.04	1.86	0.55	1.37	0.82
May-16	0.82	1.30	1.81	2.63	0.48	0.99	1.81	0.51	1.33	0.82
Jun-16	0.73	1.17	1.64	2.45	0.44	0.91	1.72	0.48	1.29	0.81
Jul-16	0.67	1.07	1.50	2.23	0.40	0.83	1.55	0.43	1.16	0.72
Aug-16	0.74	1.13	1.56	2.26	0.40	0.82	1.52	0.42	1.13	0.71
Sep-16	0.77	1.18	1.63	2.35	0.41	0.86	1.58	0.45	1.17	0.72
Oct-16	0.84	1.27	1.76	2.50	0.43	0.92	1.66	0.49	1.23	0.74
Nov-16	0.98	1.60	2.14	2.86	0.62	1.16	1.88	0.55	1.27	0.72
Dec-16	1.20	1.96	2.49	3.11	0.76	1.30	1.92	0.53	1.15	0.62
Jan-17	1.21	1.92	2.43	3.02	0.71	1.23	1.81	0.52	1.10	0.59
Feb-17	1.20	1.90	2.42	3.03	0.70	1.22	1.83	0.52	1.13	0.61
Mar-17	1.31	2.01	2.48	3.08	0.70	1.17	1.77	0.47	1.07	0.60
Apr-17	1.24	1.82	2.30	2.94	0.58	1.06	1.70	0.47	1.12	0.64
May-17	1.30	1.84	2.30	2.96	0.54	1.00	1.66	0.47	1.12	0.66
Jun-17	1.34	1.77	2.19	2.80	0.43	0.84	1.45	0.41	1.02	0.61

**Union Electric Company
Case No. GR-2019-0077**

Average Yields of Different Treasury Securities and Average Spreads Between Yields

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

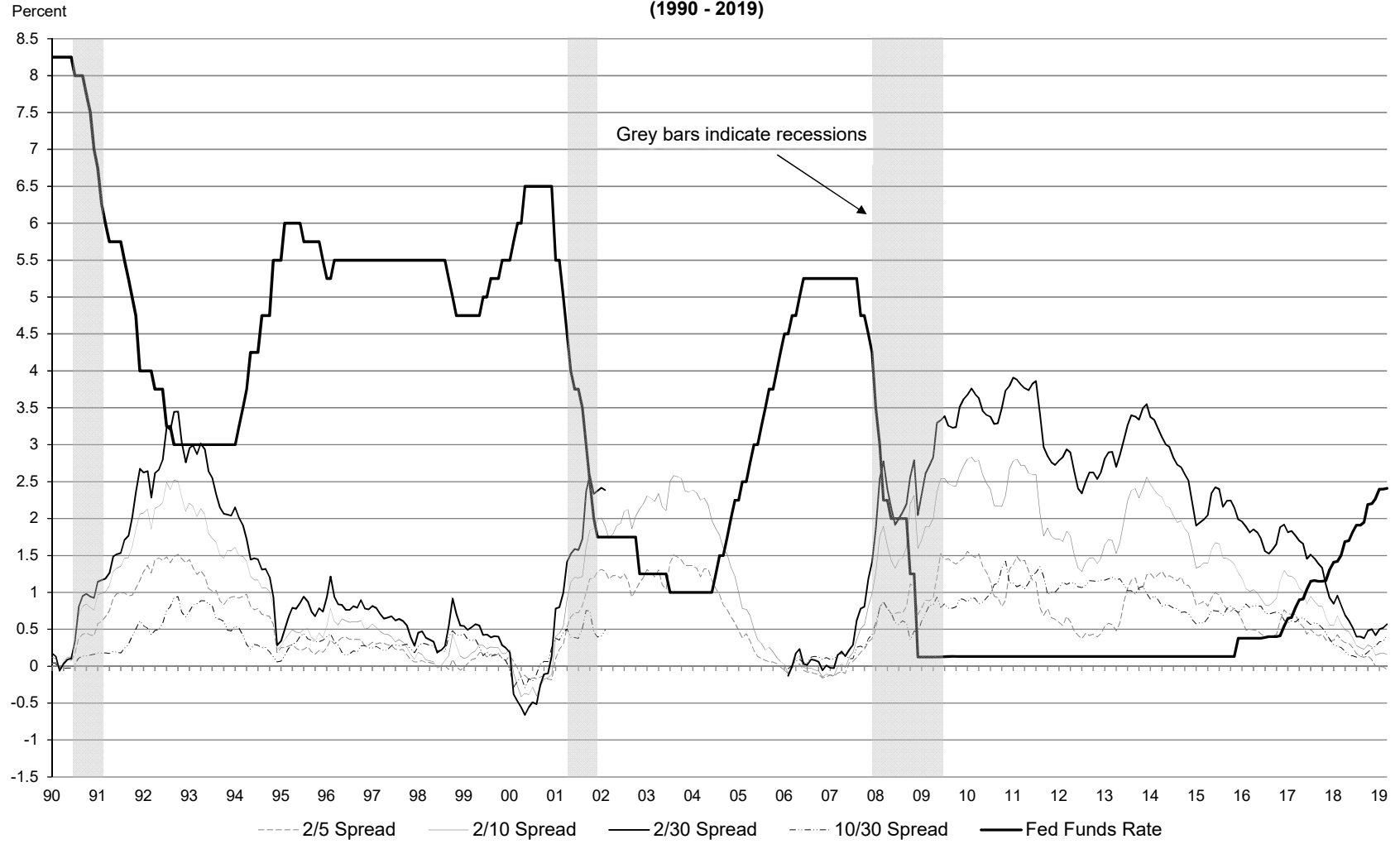
Underlined Spreads Correspond to Inverted Yield Curves

Date	2YR	5YR	10YR	30YR	2/5 Spread	2/10 Spread	2/30 Spread	5/10 Spread	5/30 Spread	10/30 Spread
Jul-17	1.37	1.87	2.32	2.88	0.50	0.95	1.51	0.45	1.01	0.57
Aug-17	1.34	1.78	2.21	2.80	0.44	0.87	1.46	0.43	1.02	0.59
Sep-17	1.38	1.80	2.20	2.78	0.41	0.82	1.39	0.40	0.98	0.57
Oct-17	1.55	1.98	2.36	2.88	0.43	0.81	1.33	0.38	0.90	0.52
Nov-17	1.70	2.05	2.35	2.80	0.35	0.66	1.11	0.30	0.75	0.45
Dec-17	1.84	2.18	2.40	2.77	0.34	0.56	0.92	0.22	0.59	0.37
Jan-18	2.03	2.38	2.58	2.88	0.35	0.55	0.85	0.20	0.50	0.29
Feb-18	2.18	2.60	2.86	3.13	0.42	0.68	0.96	0.26	0.53	0.27
Mar-18	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
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	0.5	0.17	0.41	0.24
Dec-18	2.68	2.68	2.83	3.10	0	0.15	0.42	0.15	0.42	0.27
Jan-19	2.54	2.54	2.71	3.04	0	0.17	0.5	0.17	0.5	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	0.2	0.61	0.41

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

Union Electric Company
Case No. GR-2019-0077

Treasury Spreads
(1990 - 2019)



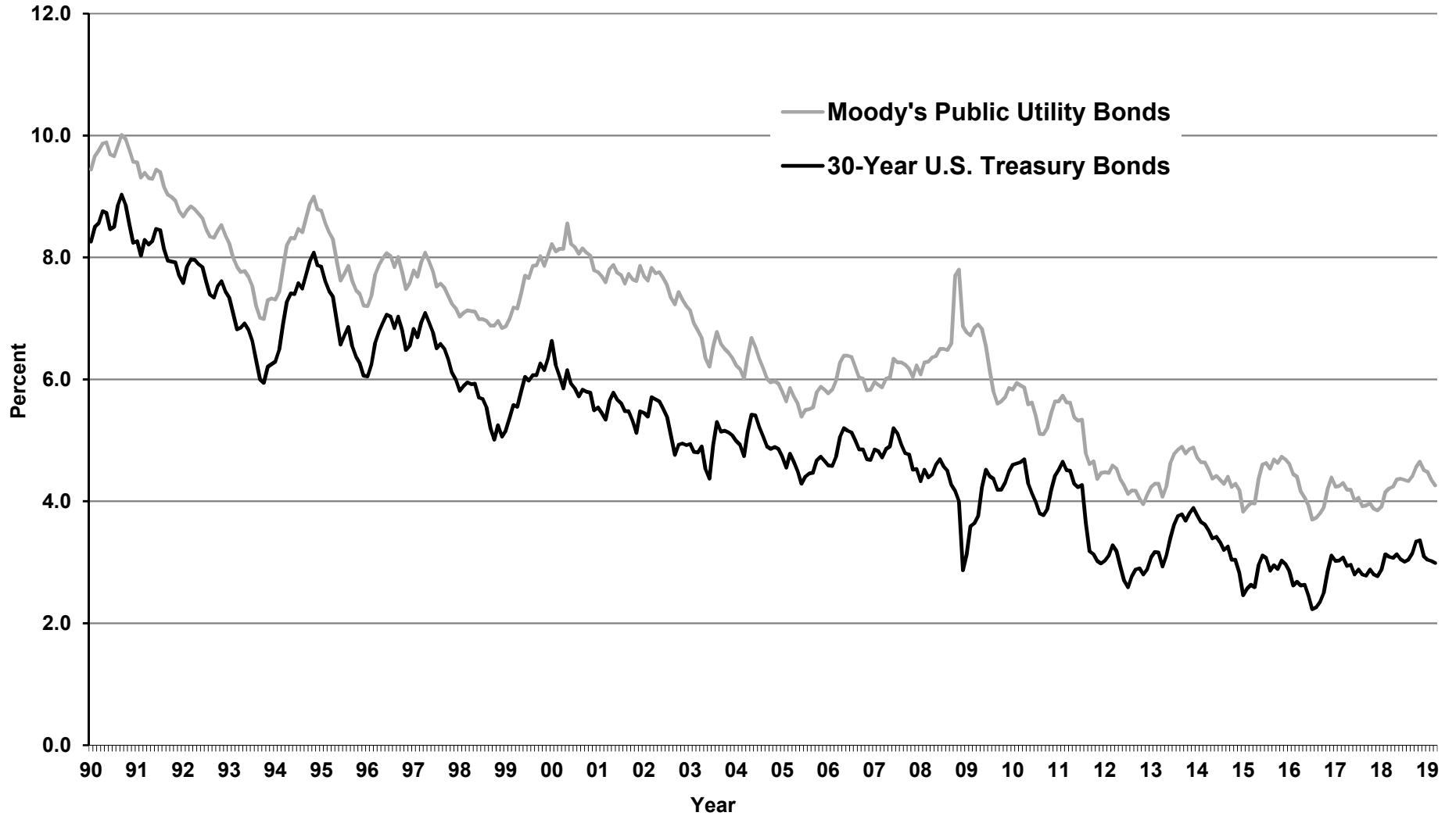
Union Electric Company
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Average Yields on Public Utility Bonds

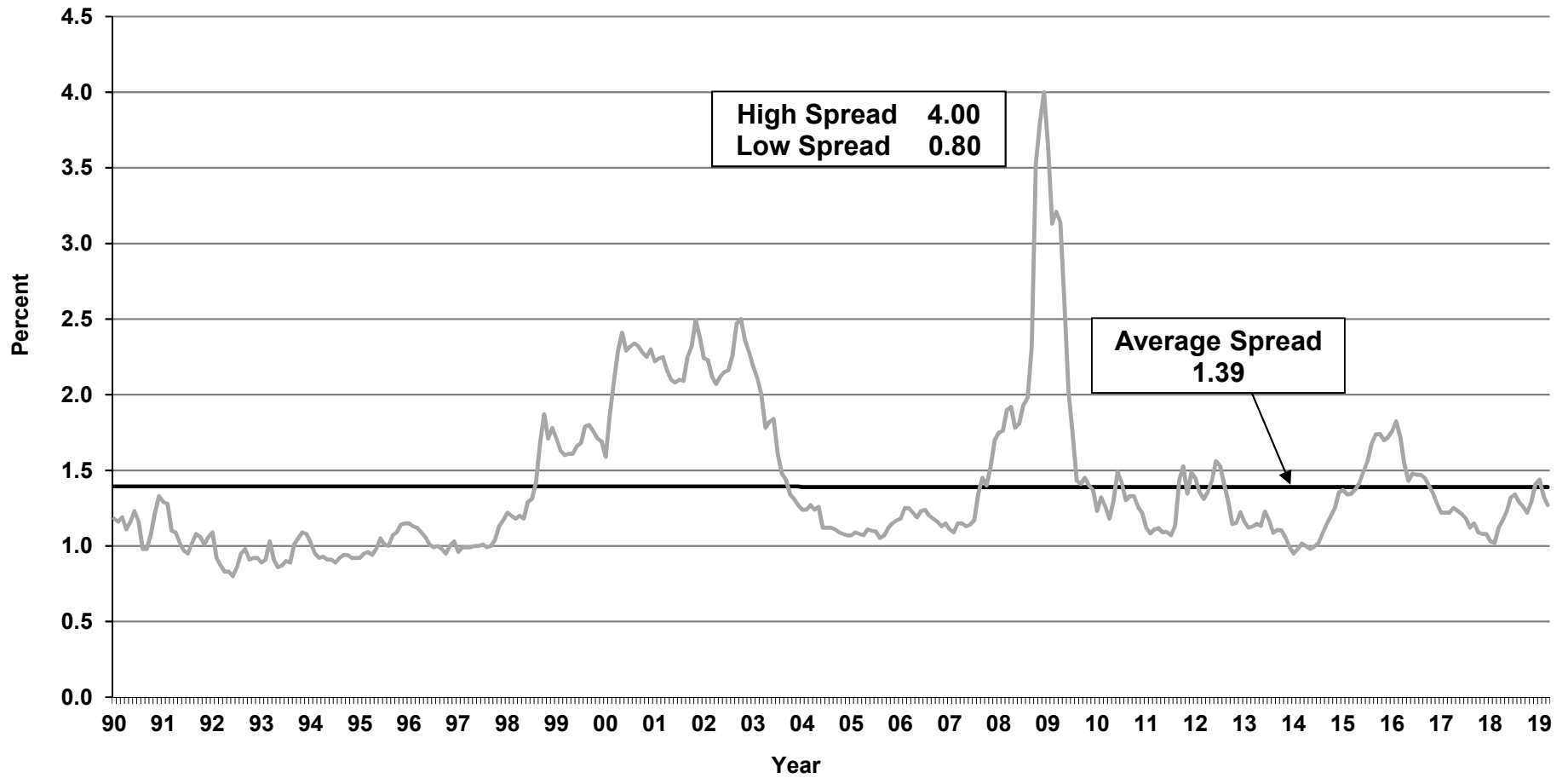
Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 1990	9.44	Jan 1996	7.20	Jan 2002	7.69	Jan 2008	6.08	Jan 2014	4.72
Feb	9.66	Feb	7.37	Feb	7.62	Feb	6.28	Feb	4.64
Mar	9.75	Mar	7.72	Mar	7.83	Mar	6.29	Mar	4.63
Apr	9.87	Apr	7.88	Apr	7.74	Apr	6.36	Apr	4.52
May	9.89	May	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	June	6.54	Jun	4.60
Jul	9.40	Jul	7.52	Jul	6.54	July	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	June	5.62	Jun	3.93
Jul	8.46	Jul	6.99	Jul	6.34	July	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	June	5.52	Jun	4.01
Jul	7.53	Jul	7.66	Jul	5.50	July	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	3.88
Dec	7.33	Dec	8.04	Dec	5.83	Dec	4.96	Dec	3.85
Jan 1994	7.31	Jan 2000	8.22	Jan 2006	5.77	Jan 2012	4.97	Jan 2018	3.91
Feb	7.44	Feb	8.10	Feb	5.83	Feb	4.99	Feb	4.15
Mar	7.83	Mar	8.14	Mar	5.98	Mar	5.13	Mar	4.21
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	June	6.39	Jun	4.67	June	4.37
Jul	8.47	Jul	8.17	July	6.37	Jul	4.56	July	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		
May	7.93	May	7.88	May	6.03	May	4.36		
Jun	7.62	Jun	7.75	June	6.34	Jun	4.70		
Jul	7.73	Jul	7.71	July	6.28	Jul	4.90		
Aug	7.86	Aug	7.57	Aug	6.28	Aug	5.00		
Sep	7.62	Sep	7.73	Sep	6.24	Sep	5.05		
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)

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



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



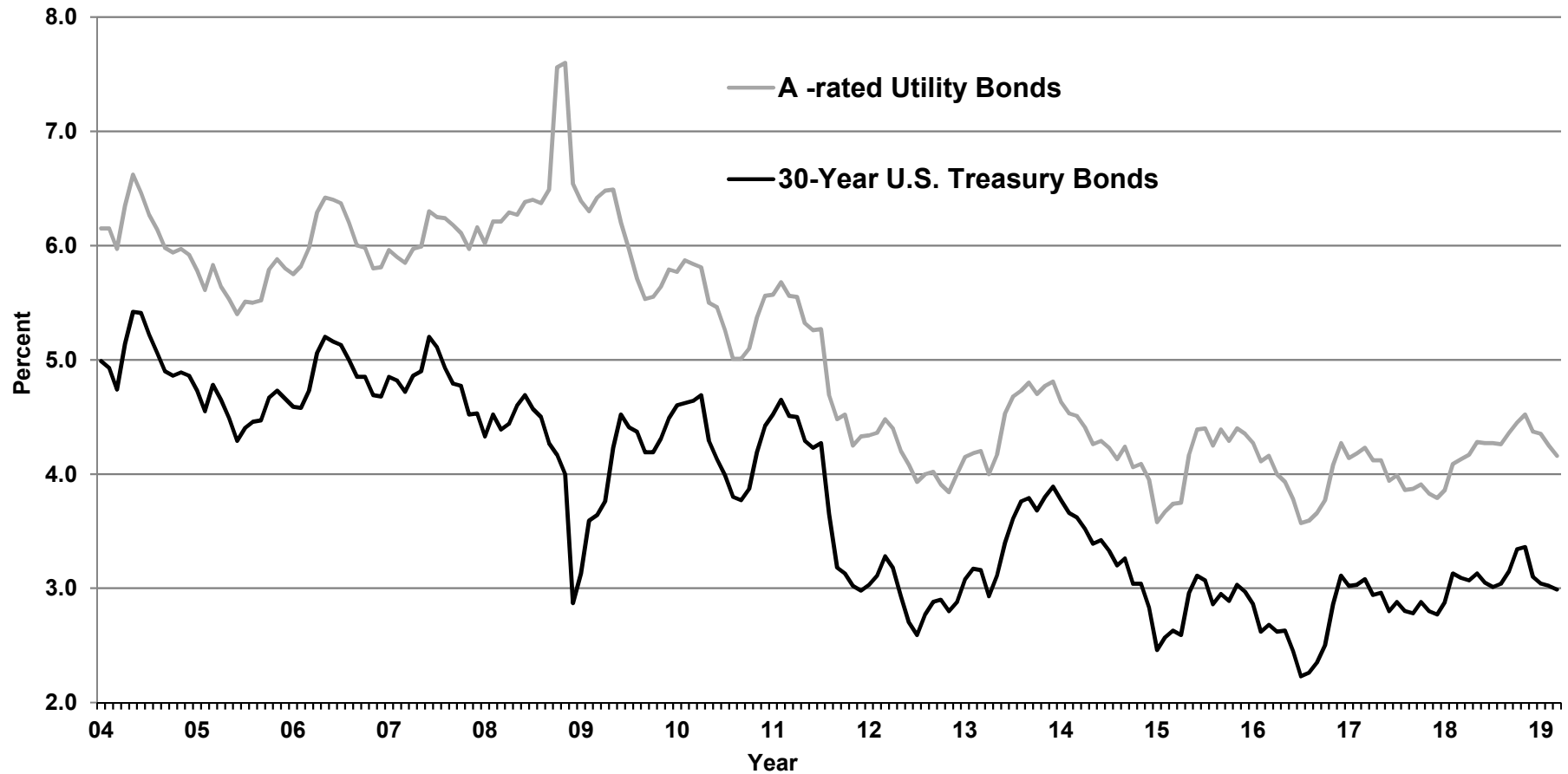
**Union Electric Company
Case No. GR-2019-0077**

Average Yields on A -rated Public Utility Bonds

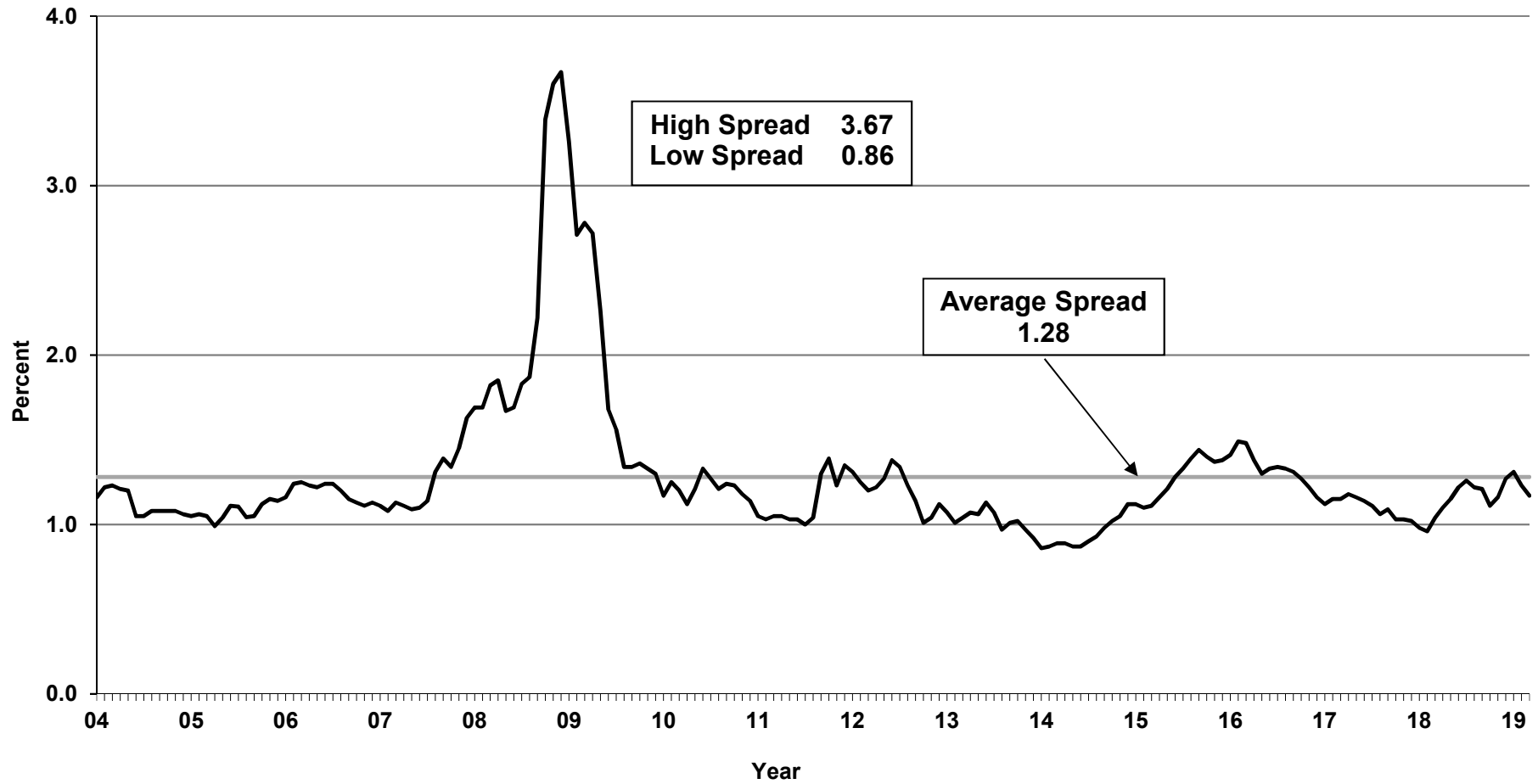
Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)	Mo/Year	Rate (%)
Jan 2004	6.15	Jan 2008	6.02	Jan 2012	4.34	Jan 2016	4.27
Feb	6.15	Feb	6.21	Feb	4.36	Feb	4.11
Mar	5.97	Mar	6.21	Mar	4.48	Mar	4.16
Apr	6.35	Apr	6.29	Apr	4.40	Apr	4.00
May	6.62	May	6.27	May	4.20	May	3.93
Jun	6.46	Jun	6.38	Jun	4.08	Jun	3.78
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		
May	5.99	May	5.32	May	4.17		
Jun	6.30	Jun	5.26	Jun	4.39		
Jul	6.25	Jul	5.27	Jul	4.40		
Aug	6.24	Aug	4.69	Aug	4.25		
Sep	6.18	Sep	4.48	Sep	4.39		
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)**



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



**Union Electric Company
Case No. GR-2019-0077**

Criteria for Selecting Comparable Gas Utility Companies

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Market Intelligence		Stock Publicly	At Least Investment Grade Credit Rating (2 of 3 agencies)	No Pending Merger or Acquisition	At Least 80% of Assets are Regulated	At Least 80% of Income from U.S. Regulated Utility Operations	L- T Growth Coverage from at least 2 equity analysts and L-T Growth Available	No Reduced Dividend Since 2016	Comparable Company Met All Criteria
Gas Utility Companies	Ticker	Traded							
Atmos Energy Corporation	ATO	YES	YES	YES	YES	YES	YES	YES	YES
Connecticut Natural Gas Corporation		NO							
Delta Natural Gas Company, Inc.		NO							
National Fuel Gas Company	NFG	YES	YES	YES	NO				
New Jersey Resources Corporation	NJR	YES	YES	YES	NO				
Northwest Natural Holding Company	NWN	YES	YES	YES	YES	YES	YES	YES	YES
ONE Gas, Inc.	OGS	YES	YES	YES	YES	YES	YES	YES	YES
Piedmont Natural Gas Company, Inc.	PNY	NO							
Public Service Company of North Carolina, Incorporated	PGS	NO							
RGCO Resources, Inc.	RGCO	YES	NO						
South Jersey Industries, Inc.	SJI	YES	YES	YES	YES	NO			
Southern Company Gas		NO							
Southwest Gas Holdings, Inc.	SWX	YES	YES	YES	YES	YES	YES	YES	YES
Spire Inc.	SR	YES	YES	YES	YES	YES	YES	YES	YES
WGL Holdings, Inc.		NO							

Sources: Market Intelligence and SEC 10-Ks

**Union Electric Company
Case No. GR-2019-0077**

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

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	<hr/> A-/A

Note: Ameren has BBB+ credit rating from S&P

Union Electric Company
Case No. GR-2019-0077

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

Ameren

(Dollars in thousands)

Capital Components	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 6,205	\$ 7,275	\$ 7,276	\$ 7,935	\$ 8,439
Equity ²	\$ 6,302	\$ 6,535	\$ 6,692	\$ 6,773	\$ 7,220
Total	\$ 12,507	\$ 13,810	\$ 13,968	\$ 14,708	\$ 15,659

Ameren Illinois

(Dollars in thousands)

Capital Components	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 2,224	\$ 2,471	\$ 2,588	\$ 2,830	\$ 3,296
Preferred Stock	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62
Equity ²	\$ 2,188	\$ 2,424	\$ 2,561	\$ 2,837	\$ 3,301
Total	\$ 4,474	\$ 4,957	\$ 5,211	\$ 5,729	\$ 6,659

Ameren Missouri

(Dollars in thousands)

Capital Components	2014	2015	2016	2017	2018
Long-Term Debt ¹	\$ 3,711	\$ 3,840	\$ 3,724	\$ 3,691	\$ 3,728
Preferred Stock	\$ 80	\$ 80	\$ 80	\$ 80	\$ 80
Equity ²	\$ 3,972	\$ 4,002	\$ 4,010	\$ 4,001	\$ 4,149
Total	\$ 7,763	\$ 7,922	\$ 7,814	\$ 7,772	\$ 7,957

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. GR-2019-0077

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

Ameren

(in percentages)

Capital Components	2014	2015	2016	2017	2018	5 Year Average
Long-Term Debt ¹	49.61%	52.68%	52.09%	53.95%	53.89%	52.44%
Equity ²	50.39%	47.32%	47.91%	46.05%	46.11%	47.56%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Ameren Illinois

(in percentages)

Capital Components	2014	2015	2016	2017	2018	5 Year Average
Long-Term Debt ¹	49.71%	49.85%	49.66%	49.40%	49.50%	49.62%
Preferred Stock	1.39%	1.25%	1.19%	1.08%	0.93%	1.17%
Equity ²	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%

Ameren Missouri

(in percentages)

Capital Components	2014	2015	2016	2017	2018	5 Year Average
Long-Term Debt ¹	47.80%	48.47%	47.66%	47.49%	46.85%	47.66%
Preferred Stock	1.03%	1.01%	1.02%	1.03%	1.01%	1.02%
Equity ²	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%

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. GR-2019-0077

Historical Capital Structure Including Current Portion of Long-Term Debt - Goodwill for Proxy Group

Debt

Company	Ticker	FY2014	FY2015	FY2016	FY2017	FY2018	Average
Atmos Energy Corporation	ATO	51.17%	49.68%	47.13%	49.19%	43.17%	48.07%
Northwest Natural Holding Company	NWN	46.36%	43.25%	45.83%	51.22%	49.41%	47.21%
One Gas, Inc.	OGS	42.34%	41.45%	40.80%	39.83%	40.55%	40.99%
Southwest Gas Holdings, Inc.	SWX	55.09%	51.69%	51.23%	52.72%	53.07%	52.76%
Spire, Inc.	SR	76.44%	74.68%	77.44%	71.88%	65.70%	73.23%
	Average	50.38%	52.97%	52.48%	52.15%	54.28%	52.45%

Equity

Company	Ticker	FY2014	FY2015	FY2016	FY2017	FY2018	Average
Atmos Energy Corporation	ATO	48.83%	50.32%	52.87%	50.81%	56.83%	51.93%
Northwest Natural Holding Company	NWN	53.64%	56.75%	54.17%	48.78%	50.59%	52.79%
One Gas, Inc.	OGS	57.66%	58.55%	59.20%	60.17%	59.45%	59.01%
Southwest Gas Holdings, Inc.	SWX	44.91%	48.31%	48.77%	47.28%	46.93%	47.24%
Spire, Inc.	SR	23.56%	25.32%	22.56%	28.12%	34.30%	26.77%
	Average	45.72%	47.85%	47.52%	47.03%	49.62%	47.55%

Source: Market Intelligence

**Union Electric Company
Case No. GR-2019-0077**

**Staff Recommended
Capital Structure for Ameren Missouri**

<u>Capital Component</u>	<u>Percentage of Capital</u>
Long-Term Debt	48.99%
Preferred Stock	1.01%
Common Equity ¹	50.00%
Total Capitalization	100%

Notes: 1. Reduces common equity to Staff's recommended equity ratio, the maximum reasonable level agreed to by Ameren and the Illinois Commerce Commission for Ameren's Illinois operations.

**Union Electric Company
Case No. GR-2019-0077**

Embedded Cost of Long-Term Debt as of June 30, 2018 for

Ameren

Total Annual Cost:	\$694,747,950
Total Carrying Value:	\$14,694,280,739
Embedded Cost = Total Annual Cost/Total Carrying Value	4.73%

Ameren Illinois

Total Annual Cost:	\$152,800,821
Total Carrying Value:	\$3,054,932,950
Embedded Cost = Total Annual Cost/Total Carrying Value	5.00%

Ameren Missouri

Total Annual Cost:	\$181,031,204
Total Carrying Value:	\$3,669,351,111
Embedded Cost = Total Annual Cost/Total Carrying Value	4.93%

Sources: Company response to Staff Data Request No. 0084

**Union Electric Company
Case No. GR-2019-0077**

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

Company Name	DPS	----- 10-Year Annual Compound Growth Rates -----			Average of Growth Rates
		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. GR-2019-0077**

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

Company Name	DPS	EPS	BVPS	Average of Growth Rates
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	9.66%	NA	9.66%
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%	7.16%	5.40%	6.58%

Source: Market Intelligence

**Union Electric Company
Case No. GR-2019-0077**

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

	(1)	(2)	(3)
Company Name	10-Year Average DPS, EPS & BVPS	5-Year Average DPS, EPS & BVPS	Mean Projected Long-Term Growth Rate
Atmos Energy Corporation	5.71%	8.56%	5.50%
Northwest Natural Holding Company	1.17%	0.57%	4.50%
One Gas, Inc.	NA	9.66%	5.78%
Southwest Gas Holdings, Inc.	6.79%	7.27%	6.13%
Spire, Inc.	5.24%	6.82%	3.40%
Average	4.73%	6.58%	5.06%

Proposed Range of Growth for Comparables: 4% - 5%

Sources: Column 1 = Schedule 8-1
Column 2 = Schedule 8-2
Column 3 = Market Intelligence as of March 31, 2019

**Union Electric Company
Case No. GR-2019-0077**

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

Company Name	(1) Expected Annual Dividend	(2) Average High/Low Stock Price	(3) Projected Dividend Yield
Atmos Energy Corporation	\$2.11	\$97.57	2.16%
Northwest Natural Holding Company	\$1.91	\$62.79	3.05%
One Gas, Inc.	\$2.00	\$84.11	2.37%
Southwest Gas Holdings, Inc.	\$2.18	\$80.27	2.72%
Spire, Inc.	\$2.38	\$78.08	3.05%
Average			<u>2.67%</u>

Proposed Dividend Yield: 2.67%

Proposed Range of Growth: 4.00% - 5.00%

Indicated Cost of Common Equity: 6.67% - 7.67%

Sources: Column 1 and 2 = Market Intelligence

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. GR-2019-0077**

**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
Case No. GR-2019-0077

**Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Company Name	Annualized Quarterly Dividend	Growth Years 1-5	6	7	Growth Years 8	9	10	Growth in Perpetuity	Cost of Equity
Atmos Energy Corporation	\$2.10	5.50%	5.22%	4.93%	4.65%	4.37%	4.08%	3.80%	6.28%
Northwest Natural Holding Company	\$1.90	4.50%	4.38%	4.27%	4.15%	4.03%	3.92%	3.80%	7.08%
One Gas, Inc.	\$1.84	5.78%	5.45%	5.12%	4.79%	4.46%	4.13%	3.80%	6.37%
Southwest Gas Holdings, Inc.	\$2.08	6.13%	5.74%	5.35%	4.97%	4.58%	4.19%	3.80%	6.92%
Spire, Inc.	\$2.37	3.40%	3.47%	3.53%	3.60%	3.67%	3.73%	3.80%	6.86%
								Average	6.70%

Sources: Column 1 = Market Intelligence

Column 2 = Market Intelligence analysts' average estimated growth rates.

Columns 3 - 7 = Linear reduction of short-term growth rate projections to sustainable level.

Column 8 = Low Range of Projected GDP Growth Rates Cited in Staff Cost of Service Report.

Note: Column 1 most recent reported quarterly dividend, as of March 31, 2019, annualized.

Union Electric Company
Case No. GR-2019-0077

**Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Company Name	Annualized Quarterly Dividend	Growth Years 1-5	6	7	Growth Years 8	9	10	Growth in Perpetuity	Cost of Equity
Atmos Energy Corporation	\$2.10	5.50%	5.25%	5.00%	4.75%	4.50%	4.25%	4.00%	6.45%
Northwest Natural Holding Company	\$1.90	4.50%	4.42%	4.33%	4.25%	4.17%	4.08%	4.00%	7.24%
One Gas, Inc.	\$1.84	5.78%	5.48%	5.19%	4.89%	4.59%	4.30%	4.00%	6.54%
Southwest Gas Holdings, Inc.	\$2.08	6.13%	5.78%	5.42%	5.07%	4.71%	4.36%	4.00%	7.09%
Spire, Inc.	\$2.37	3.40%	3.50%	3.60%	3.70%	3.80%	3.90%	4.00%	7.03%
								Average	6.87%

Sources: Column 1 = Market Intelligence

Column 2 = Market Intelligence analysts' average estimated growth rates.

Columns 3 - 7 = Linear reduction of short-term growth rate projections to sustainable level.

Column 8 = Mid Range GDP Growth Rates Cited in Staff Cost of Service.

Note: Column 1 most recent reported quarterly dividend, as of March 31, 2019, annualized.

Union Electric Company
Case No. GR-2019-0077

**Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Company Name	Annualized Quarterly Dividend	Growth Years 1-5	6	7	Growth Years 8	9	10	Growth in Perpetuity	Cost of Equity
Atmos Energy Corporation	\$2.10	5.50%	5.28%	5.07%	4.85%	4.63%	4.42%	4.20%	6.62%
Northwest Natural Holding Company	\$1.90	4.50%	4.45%	4.40%	4.35%	4.30%	4.25%	4.20%	7.41%
One Gas, Inc.	\$1.84	5.78%	5.52%	5.25%	4.99%	4.73%	4.46%	4.20%	6.71%
Southwest Gas Holdings, Inc.	\$2.08	6.13%	5.81%	5.49%	5.17%	4.84%	4.52%	4.20%	7.25%
Spire, Inc.	\$2.37	3.40%	3.53%	3.67%	3.80%	3.93%	4.07%	4.20%	7.19%
								Average	7.04%

Sources: Column 1 = Market Intelligence

Column 2 = Market Intelligence analysts' average estimated growth rates.

Columns 3 - 7 = Linear reduction of short-term growth rate projections to sustainable level.

Column 8 = High Range of Projected GDP Growth Rates Cited in Staff Cost of Service Report.

Note: Column 1 most recent reported quarterly dividend, as of March 31, 2019, annualized.

**Union Electric Company
Case No. GR-2019-0077**

**Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies during the 2017 Spire Missouri Rate Cases Timeframe**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Company Name	Annualized Quarterly Dividend	Growth Years 1-5	6	7	Growth Years 8	9	10	Growth in Perpetuity	Cost of Equity
Atmos Energy Corporation	\$1.80	7.00%	6.47%	5.93%	5.40%	4.87%	4.33%	3.80%	6.59%
Northwest Natural Holding C	\$1.88	4.67%	4.53%	4.38%	4.24%	4.09%	3.95%	3.80%	7.21%
One Gas, Inc.	\$1.68	5.37%	5.11%	4.85%	4.59%	4.32%	4.06%	3.80%	6.56%
Southwest Gas Holdings, Inc	\$1.98	4.95%	4.76%	4.57%	4.38%	4.18%	3.99%	3.80%	6.56%
Spire, Inc.	\$2.10	3.96%	3.93%	3.91%	3.88%	3.85%	3.83%	3.80%	6.95%
								Average	6.77%

Sources: Column 1 = Quarterly dividend reported for 2017Q2, annualized.

Column 2 = Market Intelligence analysts' average estimated growth rates during Spire Missouri rate cases timeframe.

Columns 3 - 7 = Linear reduction of short-term growth rate projections to sustainable level.

Column 8 = Low Range GDP growth rates cited in Staff Cost of Service.

**Union Electric Company
Case No. GR-2019-0077**

**Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Constant Comparable Gas Utility Companies during the 2017 Spire Missouri Rate Cases Timeframe**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Company Name	Annualized Quarterly Dividend	Growth Years 1-5	6	7	Growth Years 8	9	10	Growth in Perpetuity	Cost of Equity
Atmos Energy Corporation	\$1.80	7.00%	6.50%	6.00%	5.50%	5.00%	4.50%	4.00%	6.76%
Northwest Natural Holding Compai	\$1.88	4.67%	4.56%	4.45%	4.34%	4.22%	4.11%	4.00%	7.37%
One Gas, Inc.	\$1.68	5.37%	5.14%	4.91%	4.69%	4.46%	4.23%	4.00%	6.73%
Southwest Gas Holdings, Inc.	\$1.98	4.95%	4.79%	4.63%	4.48%	4.32%	4.16%	4.00%	6.73%
Spire, Inc.	\$2.10	3.96%	3.97%	3.97%	3.98%	3.99%	3.99%	4.00%	7.11%
								Average	6.94%

Sources: Column 1 = Quarterly dividend reported for 2017Q2, annualized.

Column 2 = Market Intelligence analysts' average estimated growth rates during Spire Missouri rate cases timeframe.

Columns 3 - 7 = Linear reduction of short-term growth rate projections to sustainable level.

Column 8 = Mid Range of projected GDP growth rates cited in Staff Cost of Service Report.

**Union Electric Company
Case No. GR-2019-0077**

**Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity
for the Comparable Gas Utility Companies during the 2017 Spire Missouri Rate Cases Timeframe**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Company Name	Annualized Quarterly Dividend	Growth Years 1-5	6	7	Growth Years 8	9	10	Growth in Perpetuity	Cost of Equity
Atmos Energy Corporation	\$1.80	7.00%	6.53%	6.07%	5.60%	5.13%	4.67%	4.20%	6.93%
Northwest Natural Holding Compa	\$1.88	4.67%	4.59%	4.51%	4.44%	4.36%	4.28%	4.20%	7.53%
One Gas, Inc.	\$1.68	5.37%	5.18%	4.98%	4.79%	4.59%	4.40%	4.20%	6.89%
Southwest Gas Holdings, Inc.	\$1.98	4.95%	4.83%	4.70%	4.58%	4.45%	4.33%	4.20%	6.90%
Spire, Inc.	\$2.10	3.96%	4.00%	4.04%	4.08%	4.12%	4.16%	4.20%	7.27%
								Average	7.11%

Sources: Column 1 = Quarterly dividend reported for 2017Q2, annualized.

Column 2 = Market Intelligence analysts' average estimated growth rates during Spire Missouri rate cases timeframe.

Columns 3 - 7 = Linear reduction of short-term growth rate projections to sustainable level.

Column 8 = Upeer bound of projected GDP growth rate.

**Union Electric Company
Case No. GR-2019-0077**

**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**

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	3.01%	0.59	4.50%	6.00%	5.67%	6.56%
Northwest Natural Holding Company	3.01%	0.61	4.50%	6.00%	5.76%	6.68%
One Gas, Inc.	3.01%	0.65	4.50%	6.00%	5.94%	6.92%
Southwest Gas Holdings, Inc.	3.01%	0.62	4.50%	6.00%	5.79%	6.72%
Spire, Inc.	3.01%	0.58	4.50%	6.00%	5.64%	6.52%
Average		0.61			5.76%	6.68%

Column 1 = The appropriate yield is equal to the average 30-year U.S. Treasury Bond yield for January, February, and March 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. Staff calculated unadjusted Beta from an Excel spreadsheet designed specifically to be used with the SNL database market and financial information, then adjusted Beta using the Blume adjustment formula as used by Value Line: $\text{Adjusted Beta} = 0.35 + 0.67 * \text{Unadjusted Beta}$

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 = $(\text{Column 1} + (\text{Column 2} * \text{Column 3}))$

Column 6 = $(\text{Column 1} + (\text{Column 2} * \text{Column 4}))$

**Union Electric Company
Case No. GR-2019-0077**

**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		<u>0.71</u>			<u>6.08%</u>	<u>7.14%</u>

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
Case No. GR-2019-0077**

Summary of Staff's Cost of Equity Estimates

Staff's Current Cost of Equity Estimates

<u>DCF Range of Growth %</u>		<u>4.00%</u>	<u>5.00%</u>	Average
DCF		6.67%	7.67%	7.17%
<u>Multi-Stage Terminal Growth Rate %</u>	<u>3.80%</u>	<u>4.00%</u>	<u>4.20%</u>	Average
Multi-Stage DCF	6.70%	6.87%	7.04%	6.87%
		<u>Geometric</u>	<u>Arithmetic</u>	Average
CAPM		5.76%	6.68%	6.22%
			Average	6.75%

Staff's Cost of Equity Estimates During the Spire Missouri Rate Cases Time Frame

<u>DCF Range of Growth %</u>		<u>4.20%</u>	<u>5.00%</u>	Average
DCF		6.91%	7.71%	7.31%
<u>Multi-Stage Terminal Growth Rate %</u>	<u>3.80%</u>	<u>4.00%</u>	<u>4.20%</u>	Average
Multi-Stage DCF	6.77%	6.94%	7.11%	6.94%
		<u>Geometric</u>	<u>Arithmetic</u>	Average
CAPM		6.08%	7.14%	6.61%
			Average	6.95%

**Union Electric Company
Case No. GR-2019-0077**

**Recommended Allowed Rate of Return as of June 30, 2018
for
Ameren Missouri**

Capital Component	Percentage of Capital	Embedded Cost	Allowed Rate of Return Common Equity Return of:		
			9.00%	9.50%	10.00%
Long-Term Debt	48.99%	4.93%	2.42%	2.42%	2.42%
Preferred Stock	1.01%	4.18%	0.04%	0.04%	0.04%
Common Equity	<u>50.00%</u>		<u>4.50%</u>	<u>4.75%</u>	<u>5.00%</u>
Total	<u>100.00%</u>		<u>6.96%</u>	<u>7.21%</u>	<u>7.46%</u>