



STATE TAX COMMISSION OF MISSOURI
 P.O. BOX 146
 JEFFERSON CITY, MO 65102-0146
 P: 573.751.2414 E: OriginalAssessment@stc.mo.gov

Cost of Capital Study
January 1, 2025
Staff Recommendation

Electric Industry (SIC 4911)			Reference
Equity:			
Risk Adjusted Models	CAPM	10.31%	Page 5
Dividend Growth Models			
	DGM or DCF Model (Dividend Growth)	9.50%	Page 7
	DGM or DCF Model (Earnings Growth)	9.50%	Page 7
	DGM or DCF Model (b * ROE = Growth)	7.50%	Page 7
	Multi Stage DCF	8.00%	Page 8
	Average	8.96%	
Estimated Cost of Equity Capital		9.70%	
Debt:			
Estimated Cost of Debt Capital		5.77%	Page 3
Cost of Capital Summary			
Capital Component	Market Capital Structure	Cost of Capital	Before-Tax Weighted Average Cost of Capital
Debt	45.00%	5.77%	2.60%
Equity	55.00%	9.70%	5.34%
Total	100.00%		7.94%
		Rounded	8.00%



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Electric Industry (SIC 4911)				Reference
Direct Rate				
Equity:				
<u>Estimated Cost of Equity Capital</u>			5.10%	Page 9
Debt:				
<u>Estimated Cost of Debt Capital</u>			3.45%	Page 10
Cost of Capital Summary				
<u>Capital Component</u>	<u>Market Capital Structure</u>	<u>Cost of Capital</u>	<u>Before-Tax Weighted Average Cost of Capital</u>	
Debt	45.00%	3.45%	1.55%	
Equity	<u>55.00%</u>	5.10%	<u>2.81%</u>	
Total	<u>100.00%</u>		<u>4.36%</u>	
		Rounded	<u>4.50%</u>	

Cost of Capital Study January 1, 2025 Analysis of Debt Capital

Electric Industry (SIC 4911)				
Ratings				
Company	Ticker		Moody's	S&P
Alliant Energy Corporation	LNT		Baa2	A-
Ameren Corporation	AEE		Baa1	BBB+
American Electric Power Company, Inc.	AEP		Baa2	BBB+
CenterPoint Energy, Inc.	CNP		Baa2	BBB+
CMS Energy Corporation	CMS		Baa2	BBB+
Entergy Corporation	ETR		Baa2	BBB+
Evergy, Inc.	EVRG		Baa2	BBB+
Fortis, Inc.	FTS.TO		Baa3	A-
MGE Energy, Inc.	MGEE		NR	NR
OGE Energy Corporation	OGE		Baa1	BBB+
Otter Tail Corporation	OTTR		Baa2	BBB
WEC Energy Group, Inc.	WEC		Baa1	A-
Average Rating			Baa2	BBB+
NR = Not Rated				
RW = Rating Withdrawn				
Mergent Bond Record, January 2025				
Corporate	Aaa	Aa	A	Baa
October	4.95%	5.17%	5.33%	5.63%
November	5.14%	5.33%	5.49%	5.78%
December	5.20%	5.37%	5.53%	5.80%
Average	5.10%	5.29%	5.45%	5.74%
Public Utilities	Aaa	Aa	A	Baa
October	-	5.29%	5.41%	5.61%
November	-	5.43%	5.55%	5.75%
December	-	5.45%	5.58%	5.77%
Average	-	5.39%	5.51%	5.71%
Industrials	Aaa	Aa	A	Baa
October	4.95%	5.05%	5.24%	5.65%
November	5.14%	5.23%	5.43%	5.80%
December	5.20%	5.28%	5.47%	5.83%
Average	5.10%	5.19%	5.38%	5.76%
Debt Yield Rate Estimate				5.77%
Data Source:				
https://www.moodys.com				
https://standardandpoors.com				
Mergent Bond Record, January 2025				

Ratings			
Dispersions & Averages			
Agency	# of Companies		
S&P			
AAA	1		
AA	2		
A	3	3	9
BBB	4	9	36
BB	5		
B	6		
CCC	7		
C	9		
D	10		
Total	12	45	
Average Rating:			3.75
Agency	# of Companies		
Moody's			
Aaa	1		
Aa	2		
A	3		
Baa	4	12	48
Ba	5		
B	6		
Caa	7		
Ca	8		
C	9		
Total	12	48	
Average Rating:			4.00

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Cost of Capital Study January 1, 2025 Analysis of the Market Capital Structure

Electric Industry (SIC 4911)								
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ticker	Debt	Debt	Stock	Shares (mil)	Equity	Equity	Total Capital
Company Name	Symbol	(\$ mil)	%	Price	Outstanding	(\$ mil)	%	(\$ mil)
Alliant Energy Corporation	LNT	10,406	40.27%	60.13	256.69	15,435	59.73%	25,841
Ameren Corporation	AEE	17,262	41.47%	90.26	269.91	24,362	58.53%	41,624
American Electric Power Company, Inc.	AEP	41,832	45.59%	93.68	532.91	49,923	54.41%	91,755
CenterPoint Energy, Inc.	CNP	20,461	49.59%	31.92	651.73	20,803	50.41%	41,264
CMS Energy Corporation	CMS	16,501	45.17%	67.04	298.79	20,031	54.83%	36,532
Entergy Corporation	ETR	28,918	47.18%	75.21	430.41	32,371	52.82%	61,289
Evergy, Inc.	EVRG	11,976	45.64%	62.02	229.98	14,263	54.36%	26,239
Fortis, Inc.	FTS.TO	33,214	61.08%	42.55	497.30	21,160	38.92%	54,374
MGE Energy, Inc.	MGEE	721	16.93%	97.68	36.21	3,537	83.07%	4,258
OGE Energy Corporation	OGE	5,053	37.57%	41.75	201.15	8,398	62.43%	13,451
Otter Tail Corporation	OTTR	944	22.74%	76.70	41.83	3,208	77.26%	4,152
WEC Energy Group, Inc.	WEC	20,024	39.76%	95.48	317.75	30,339	60.24%	50,363
Mean:		17,276	41.08%			20,319	58.92%	37,595
Median:		16,882	43.32%			20,417	56.68%	38,898
Market Capital Structure Estimate:		Debt:	45.00%			Equity:	55.00%	
Data Source:								
Columns (1) & (4), Value Line Industry Summary & Index, 03-07-2025								
Column (2) = Column (1) / Column (7)								
Column (3), NASDAQ, 12-31-2024 - 30-Day Average								
Column (5) = Column (3) * Column (4)								
Column (6) = Column (5) / Column (7)								
Column (7) = Column (1) + Column (5)								

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Cost of Capital Study
January 1, 2025
Capital Asset Pricing Model (CAPM)

$$\text{CAPM} \implies K_e = R_f + (\beta * \text{ERP})$$

Electric Industry (SIC 4911)	
Risk-Free Rate (R_f)	4.58%
Beta (β)	0.93
Equity Risk Premium (ERP): ($R_m - R_f$)*	6.16%
Adjusted Equity Risk Premium: ($\beta * \text{ERP}$)	5.73%
Cost of Equity Capital - CAPM	10.31%
U.S. Department of the Treasury, Daily Treasury Yield Curve Rates, Selected Yields	
U.S. Treasury Securities:	
2024 December - 30 Day	4.58%
2024 November - 60 Day	4.56%
2024 October - 90 Day	4.49%
Risk-Free Rate of Return R_f, 30-year Treasury Rate. 2024 December - 30 Day Average.	4.58%
* Equity Risk Premium = Average of 7.31% (historical) and 5.00% (Kroll's Recommended)	

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Cost of Capital Study

January 1, 2025

Beta (β) Analysis

Electric Industry (SIC 4911)		
Company Name	Ticker Symbol	Beta " β "
ALLETE, Inc.	ALE	NA
Alliant Energy Corporation	LNT	0.95
Ameren Corporation	AEE	0.90
American Electric Power Company, Inc.	AEP	0.85
CenterPoint Energy, Inc.	CNP	1.10
CMS Energy Corporation	CMS	0.90
Entergy Corporation	ETR	1.00
Evergy, Inc.	EVRG	0.95
Fortis, Inc.	FTS.TO	0.75
MGE Energy, Inc.	MGEE	0.80
OGE Energy Corporation	OGE	1.05
Otter Tail Corporation	OTTR	0.95
WEC Energy Group, Inc.	WEC	0.90
	Mean:	0.93
	Median:	0.93
	Beta (β) Estimate:	0.93
Data Source: Value Line Industry Summary & Index, 03-07-2025		

Cost of Capital Study
January 1, 2025
Dividend Growth Model (DGM or DCF)

DGM or DCF Model $\implies K_e = \frac{D_1}{P_0} + g$ where

K_e = Cost of Equity
 D_1 = Expected Dividends
 P_0 = Current Price
 g = Sustainable Growth

Electric Industry (SIC 4911)												
		(1)	(2)		(3)	(4)	(5)	(6)				
		Stock	Expected	Dividend	Dividend	Earnings						
	Ticker	Price	Dividend	Yield	Growth	Growth				(Dividends)	(Earnings)	$g=(b * ROE)$
Company Name	Symbol	P_0	D_1	(D_1 / P_0)	g	g	b	ROE	$g=(b * ROE)$	K_e	K_e	K_e
ALLETE, Inc.	ALE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alliant Energy Corporation	LNT	60.13	2.04	3.39%	6.00%	6.00%	29.00%	9.90%	2.87%	9.39%	9.39%	6.26%
Ameren Corporation	AEE	90.26	2.85	3.16%	6.50%	6.50%	44.00%	11.00%	4.84%	9.66%	9.66%	8.00%
American Electric Power Company, Inc.	AEP	93.68	3.80	4.06%	5.50%	6.50%	37.00%	11.00%	4.07%	9.56%	10.56%	8.13%
CenterPoint Energy, Inc.	CNP	31.92	0.89	2.79%	6.00%	6.50%	51.00%	10.00%	5.10%	8.79%	9.29%	7.89%
CMS Energy Corporation	CMS	67.04	2.20	3.28%	5.00%	6.00%	38.00%	12.40%	4.71%	8.28%	9.28%	7.99%
Entergy Corporation	ETR	75.21	2.43	3.23%	5.50%	3.00%	5.00%	6.90%	0.35%	8.73%	6.23%	3.58%
Evergy, Inc.	EVRG	62.02	2.71	4.37%	7.00%	7.50%	32.00%	9.00%	2.88%	11.37%	11.87%	7.25%
Fortis, Inc.	FTS.TO	42.55	2.49	5.85%	6.00%	5.00%	18.00%	7.20%	1.30%	11.85%	10.85%	7.15%
MGE Energy, Inc.	MGEE	97.68	1.95	2.00%	6.50%	7.00%	49.00%	10.50%	5.15%	8.50%	9.00%	7.15%
OGE Energy Corporation	OGE	41.75	1.71	4.10%	3.00%	6.50%	25.00%	12.30%	3.08%	7.10%	10.60%	7.18%
Otter Tail Corporation	OTTR	76.70	2.10	2.74%	7.00%	4.50%	48.00%	18.80%	9.02%	9.74%	7.24%	11.76%
WEC Energy Group, Inc.	WEC	95.48	3.57	3.74%	7.00%	6.00%	32.00%	12.30%	3.94%	10.74%	9.74%	7.68%
Mean:				3.56%	5.92%	5.92%	34.00%	10.94%	3.94%	9.48%	9.48%	7.50%
Median:				3.34%	6.00%	6.25%	34.50%	10.75%	4.01%	9.48%	9.53%	7.47%
Cost of Equity Capital - DCF K_e Estimate:										9.50%	9.50%	7.50%

$b = (1 - \text{payout ratio}) = \text{Retention Ratio}$
 ROE = Return on Book Equity
Data Source:
 Column (1), NASDAQ, 12-31-2024, 30-day average
 Columns (2) - (6), Value Line Industry Summary & Index, 03-07-2025

Cost of Capital Study

January 1, 2025

Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Expected Annualized Quarterly	Growth Years	Growth Year	Growth Year	Growth Year	Growth Year	Growth Year	Growth in Perpetuity	Cost of Equity
Company Name	Dividend	1-5	6	7	8	9	10		
Alliant Energy Corporation	\$2.04	6.00%	5.63%	5.26%	4.89%	4.52%	4.15%	3.80%	7.85%
Ameren Corporation	\$2.85	6.50%	6.05%	5.60%	5.15%	4.70%	4.25%	3.80%	7.69%
American Electric Power Comp	\$3.80	5.50%	5.22%	4.94%	4.66%	4.38%	4.10%	3.80%	8.48%
CenterPoint Energy, Inc.	\$0.89	6.00%	5.63%	5.26%	4.89%	4.52%	4.15%	3.80%	7.13%
CMS Energy Corporation	\$2.20	5.00%	4.80%	4.60%	4.40%	4.20%	4.00%	3.80%	7.47%
Entergy Corporation	\$2.43	5.50%	5.22%	4.94%	4.66%	4.38%	4.10%	3.80%	7.54%
Evergy, Inc.	\$2.71	7.00%	6.47%	5.94%	5.41%	4.88%	4.35%	3.80%	9.31%
Fortis, Inc.	\$2.49	6.00%	5.63%	5.26%	4.89%	4.52%	4.15%	3.80%	10.71%
MGE Energy, Inc.	\$1.95	6.50%	6.05%	5.60%	5.15%	4.70%	4.25%	3.80%	6.26%
OGE Energy Corporation	\$1.71	3.00%	3.13%	3.26%	3.39%	3.52%	3.65%	3.80%	7.84%
Otter Tail Corporation	\$2.10	7.00%	6.47%	5.94%	5.41%	4.88%	4.35%	3.80%	7.29%
WEC Energy Group, Inc.	\$3.57	7.00%	6.47%	5.94%	5.41%	4.88%	4.35%	3.80%	8.53%
								Average:	8.01%
								Median:	7.77%
Cost of Equity Capital - DCF Ke Estimate:									8.00%

Data Source:

Column (1) = Value Line Industry Summary & Index, 03-07-2025

Column (2) = Value Line average estimated growth rates.

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

Column (8) = Long Term Projected GDP Growth Rate Projections from U.S. Federal Reserve.

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Cost of Capital Study January 1, 2025 Support for Market Multiples

Electric Industry (SIC 4911)				
		(1)	(2)	
Company Name	Ticker Symbol	Stock Price	Earnings	P/E Multiple
ALLETE, Inc.	ALE	NA	NA	NA
Alliant Energy Corporation	LNT	60.13	2.69	22.35
Ameren Corporation	AEE	90.26	4.59	19.66
American Electric Power Company, Inc.	AEP	93.68	5.61	16.70
CenterPoint Energy, Inc.	CNP	31.92	1.58	20.20
CMS Energy Corporation	CMS	67.04	3.33	20.13
Entergy Corporation	ETR	75.21	2.45	30.70
Evergy, Inc.	EVRG	62.02	3.80	16.32
Fortis, Inc.	FTS.TO	42.55	3.28	12.97
MGE Energy, Inc.	MGEE	97.68	3.45	28.31
OGE Energy Corporation	OGE	41.75	2.19	19.06
Otter Tail Corporation	OTTR	76.70	7.17	10.70
WEC Energy Group, Inc.	WEC	95.48	4.89	19.53
			Mean	19.72
			Median	19.60
			P/E Estimate	19.60
			Equity Rate	5.10%
Data Source: Column (1) NASDAQ, 12-31-2024 NASDAQ, 30-day average Column (2) Value Line Industry Summary & Index, 03-07-2025				

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Cost of Capital Study
January 1, 2025
Direct Debt Rate Calculation

Electric Industry (SIC 4911)	
Direct Capitalization Debt Rate	
Interest Expense (\$ mil)	6,743
Total Value of LT Debt (TVLTD) (\$ mil)	195,286
Current Yield = Interest Expense/TVLTD	3.45%
Data Source: Value Line Investment Survey, 03-07-2025	



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Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)			Reference
Equity:			
Risk Adjusted Models			Page 5
	CAPM	11.97%	
Dividend Growth Models			Page 7 Page 7 Page 7 Page 8
	DGM or DCF Model (Dividend Growth)	11.30%	
	DGM or DCF Model (Earnings Growth)	9.11%	
	DGM or DCF Model (b * ROE = Growth)	11.20%	
	Multi Stage DCF	9.70%	
	Average	10.66%	
Estimated Cost of Equity Capital		13.71%	
Debt:			Page 3
Estimated Cost of Debt Capital		5.66%	
Cost of Capital Summary			
Capital Component	Market Capital Structure	Cost of Capital	Before-Tax Weighted Average Cost of Capital
Debt	30.00%	5.66%	1.70%
Equity	70.00%	13.71%	9.60%
TOTAL	100.00%		11.30%
		Rounded	11.25%



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Cost of Capital Study January 1, 2025 Staff Recommendation

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)				Reference
Direct Rate				
Equity:				
	<u>Estimated Cost of Equity Capital</u>	6.67%		Page 9
Debt:				
	<u>Estimated Cost of Debt Capital</u>	10.03%		Page 10
Cost of Capital Summary				
<u>Capital Component</u>	<u>Market Capital Structure</u>	<u>Cost of Capital</u>	<u>Before-Tax Weighted Average Cost of Capital</u>	
Debt	30.00%	10.03%	3.01%	
Equity	<u>70.00%</u>	6.67%	<u>4.67%</u>	
Total	<u>100.00%</u>		<u>7.68%</u>	
		Rounded	<u>8.00%</u>	

Cost of Capital Study
January 1, 2025
Analysis of Debt Capital

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)				
Ratings				
Company	Ticker		Moody's	S&P
Cheniere Energy PTRS	CQP		Baa3	BBB
Chevron Corp.	CVX		Aa2	AA-
Devon Energy	DVN		Baa2	BBB
Enbridge, Inc.	ENB.TO		Baa2	BBB+
Enterprise Products	EPD		A3	A-
EOG Resources	EOG		A3	A-
Exxon Mobil Corp.	XOM		Aa2	AA-
Hess Corp.	HES		Baa3	BBB-
Hess Midstream	HESM		Ba1	BB+
Kinder Morgan, Inc.	KMI		Baa2	BBB
Marathon Petroleum	MPC		Baa2	BBB
National Fuel Gas	NFG		Baa3	BBB-
Oneok, Inc	OKE		Baa2	BBB
Ovintiv	OVV		Baa3	BBB-
Phillips 66	PSX		A3	BBB+
Valero Energy	VLO		Baa2	BBB
Western Midstream	WES		Baa3	BBB-
Williams Co, Inc.	WMB		Baa2	BBB
Average Rating			Baa	BBB
NR = Not Rated				
RW = Rating Withdrawn				
Mergent Bond Record, January 2024				
Corporate	Aaa	Aa	A	Baa
October	4.95%	5.17%	5.33%	5.63%
November	5.14%	5.33%	5.49%	5.78%
December	5.20%	5.37%	5.53%	5.80%
Average	5.10%	5.29%	5.45%	5.74%
Public Utilities	Aaa	Aa	A	Baa
October	-	5.29%	5.41%	5.61%
November	-	5.43%	5.55%	5.75%
December	-	5.45%	5.58%	5.77%
Average	-	5.39%	5.51%	5.71%
Industrials	Aaa	Aa	A	Baa
October	4.95%	5.05%	5.24%	5.65%
November	5.14%	5.23%	5.43%	5.80%
December	5.20%	5.28%	5.47%	5.83%
Average	5.10%	5.19%	5.38%	5.76%
Debt Yield Rate Estimate				5.66%
Data Source:				
https://www.moody.com				
https://standardandpoors.com				
Mergent Bond Record, January 2025				

Ratings				
Dispersions & Averages				
# of				
Agency	Companies			
S&P				
AAA	1			
AA	2	1	2	
A	3	2	6	
BBB	4	12	48	
BB	5	1	5	
B	6			
CCC	7			
C	9			
D	10			
Total		16	61	
Average Rating:				3.81
# of				
Agency	Companies			
Moody's				
Aaa	1			
Aa	2	1	2	
A	3	3	9	
Baa	4	11	44	
Ba	5	1	5	
B	6			
Caa	7			
Ca	8			
C	9			
Total		16	60	
Average Rating:				3.75

¹ - Public Utilities Debt Cost lies between 'A' (5.51%) and 'Baa' (5.71%) Ratings - 3.75 Assigned Value. Average of the two yields is the appropriate Debt Cost Estimate.

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Cost of Capital Study January 1, 2025 Analysis of the Market Capital Structure

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Company Name	Stock Symbol	Debt (\$ mil)	Debt %	Stock Price	Shares (mil) Outstanding	Equity (\$ mil)	Equity %	Total Capital (\$ mil)
Cheniere Energy PTRS	CQP	15,525	36.67%	55.40	484.05	26,816	63.33%	42,341
Chevron Corp.	CVX	NA	NA	149.94	NA	NA	NA	NA
Devon Energy	DVN	8,884	28.93%	33.22	656.90	21,822	71.07%	30,706
Enbridge, Inc.	ENB.TO	95,300	50.92%	42.17	2,177.96	91,845	49.08%	187,145
Enterprise Products	EPD	29,498	29.98%	31.78	2,167.57	68,885	70.02%	98,383
EOG Resources	EOG	3,776	5.25%	121.07	562.50	68,102	94.75%	71,878
Exxon Mobil Corp.	XOM	42,550	8.12%	109.57	4,395.00	481,560	91.88%	524,110
Hess Corp.	HES	NA	NA	136.32	NA	NA	NA	NA
Hess Midstream	HESM	3,490	47.82%	36.58	104.10	3,808	52.18%	7,298
Kinder Morgan, Inc.	KMI	32,000	34.70%	27.10	2,221.64	60,206	65.30%	92,206
Marathon Petroleum	MPC	28,220	38.16%	142.29	321.39	45,731	61.84%	73,951
National Fuel Gas	NFG	2,687	32.55%	60.93	91.36	5,567	67.45%	8,254
Oneok, Inc	OKE	28,137	31.80%	103.28	584.18	60,334	68.20%	88,471
Ovintiv	OVV	5,877	35.84%	40.41	260.32	10,520	64.16%	16,397
Phillips 66	PSX	19,998	15.71%	119.20	900.00	107,280	84.29%	127,278
Valero Energy	VLO	10,806	21.31%	126.02	316.59	39,897	78.69%	50,703
Western Midstream	WES	7,937	34.69%	39.26	380.56	14,941	65.31%	22,878
Williams Co, Inc.	WMB	2,711	3.91%	54.65	1,219.01	66,619	96.09%	69,330
Mean:		21,087	28.52%			73,371	71.48%	94,458
Median:		13,166	32.18%			52,969	67.83%	70,604
Market Capital Structure Estimate:		Debt:	30.00%			Equity:	70.00%	

Data Source:

Columns (1) & (4), Value Line Industry Summary & Index, 11-22-2024

Column (2) = Column (1) / Column (7)

Column (3), NASDAQ, 12-31-2024

Column (5) = Column (3) * Column (4)

Column (7) = Column (1) + Column (5)

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Cost of Capital Study
January 1, 2025
Capital Asset Pricing Model (CAPM)

$$\text{CAPM} \implies K_e = R_f + \beta (\text{ERP})$$

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)	
Risk-Free Rate	4.58%
Beta (β)	1.20
Equity Risk Premium (ERP): $(R_m - R_f)^*$	6.16%
Adjusted Equity Risk Premium: $(\beta * \text{ERP})$	7.39%
Cost of Equity Capital - CAPM	11.97%
U.S. Department of the Treasury, Daily Treasury Yield Curve Rates, Selected Yields	
U.S. Treasury Securities:	
2024 December - 30 Day	4.58%
2024 November - 60 Day	4.56%
2024 October - 90 Day	4.49%
Risk-Free Rate of Return R_f, 30-year Treasury Rate. 2024 December - 30 Day Average.	4.58%
* Equity Risk Premium = Average of 7.31% (historical) and 5.0% (Kroll's Recommended)	

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Cost of Capital Study

January 1, 2025

Beta (β) Analysis

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)			
Company Name	Stock Symbol		Beta " β "
Cheniere Energy PTRS	CQP		0.95
Devon Energy	DVN		1.45
Enbridge, Inc.	ENB.TO		0.85
Enterprise Products	EPD		1.00
EOG Resources	EOG		1.15
Exxon Mobil Corp.	XOM		1.05
Hess Midstream	HESM		1.05
Kinder Morgan, Inc.	KMI		1.15
Marathon Petroleum	MPC		1.50
National Fuel Gas	NFG		0.85
Oneok, Inc	OKE		1.50
Ovintiv	OVV		1.55
Phillips 66	PSX		1.25
Valero Energy	VLO		1.40
Western Midstream	WES		1.35
Williams Co, Inc.	WMB		1.10
		Mean:	1.20
		Median:	1.15
		Beta (β) Estimate:	1.20
Data Source: Value Line Industry Summary & Index, 11-22-2024			

Cost of Capital Study
January 1, 2025
Dividend Growth Model (DGM or DCF)

DGM or DCF Model ==> $K_e =$

$$\frac{D_1}{P_0} + g$$

where

$K_e =$ Cost of Equity
 $D_1 =$ Expected Dividends
 $P_0 =$ Current Price
 $g =$ Sustainable Growth

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)													
Company Name	Stock Symbol	(1)	(2)	Dividend Yield (D_1 / P_0)	(3)	(4)	(5)			(6)	(Dividends) K_e	(Earnings) K_e	$g=(b * ROE)$ K_e
		Stock Price P_0	Expected Dividend D_1		Dividend Growth g	Earnings Growth g	b	ROE	$g=(b * ROE)$				
Cheniere Energy PTRS	CQP	55.40	3.28	5.92%	4.00%	1.50%	43.00%	NMF	NMF	9.92%	7.42%	NMF	
Devon Energy	DVN	33.22	0.96	2.89%	9.50%	3.50%	82.00%	21.50%	17.63%	12.39%	6.39%	20.52%	
Enbridge, Inc.	ENB.TO	42.17	3.80	9.01%	2.50%	5.00%	NMF	9.00%	NMF	11.51%	14.01%	NMF	
Enterprise Products	EPD	31.78	2.20	6.92%	10.00%	6.00%	22.00%	20.00%	4.40%	16.92%	12.92%	11.32%	
EOG Resources	EOG	121.07	4.00	3.30%	11.00%	7.00%	69.00%	22.50%	15.53%	14.30%	10.30%	18.83%	
Exxon Mobil Corp.	XOM	109.57	4.00	3.65%	3.00%	-3.00%	52.00%	13.00%	6.76%	6.65%	0.65%	10.41%	
Hess Midstream	HESM	36.58	3.05	8.34%	9.00%	11.00%	-8.00%	48.50%	-3.88%	17.34%	19.34%	4.46%	
Kinder Morgan, Inc.	KMI	27.10	1.20	4.43%	6.00%	10.00%	0.00%	7.50%	0.00%	10.43%	14.43%	4.43%	
Marathon Petroleum	MPC	142.29	3.70	2.60%	6.00%	-6.00%	68.00%	16.00%	10.88%	8.60%	-3.40%	13.48%	
National Fuel Gas	NFG	60.93	2.04	3.35%	3.00%	4.00%	60.00%	16.20%	9.72%	6.35%	7.35%	13.07%	
Oneok, Inc	OKE	103.28	4.10	3.97%	4.00%	12.00%	21.00%	17.00%	3.57%	7.97%	15.97%	7.54%	
Ovintiv	OVV	40.41	1.32	3.27%	10.00%	5.50%	80.00%	14.50%	11.60%	13.27%	8.77%	14.87%	
Phillips 66	PSX	119.20	4.70	3.94%	6.00%	0.50%	27.00%	8.50%	2.30%	9.94%	4.44%	6.24%	
Valero Energy	VLO	126.02	4.26	3.38%	2.00%	-6.00%	50.00%	10.50%	5.25%	5.38%	-2.62%	8.63%	
Western Midstream	WES	39.26	3.55	9.04%	12.50%	7.00%	20.00%	46.00%	9.20%	21.54%	16.04%	18.24%	
Williams Co, Inc.	WMB	54.65	2.02	3.70%	4.50%	10.00%	5.00%	21.00%	1.05%	8.20%	13.70%	4.75%	
Mean:				4.86%	6.44%	4.25%	39.40%	19.45%	6.72%	11.29%	9.11%	11.20%	
Median:				3.82%	6.00%	5.25%	43.00%	16.20%	6.01%	10.19%	9.54%	10.87%	
Cost of Equity Capital - DCF K_e Estimate:										11.30%	9.11%	11.20%	

Notes:
 $b = (1 - \text{payout ratio}) = \text{Retention Ratio}$
 ROE = Return on Book Equity
 Not Meaningful (NMF)

Data Source:
 Column (1), NASDAQ, 12-31-2024, 30-day average
 Columns (2) - (6), Value Line Industry Summary & Index, 11-22-2024

Cost of Capital Study

January 1, 2025

Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Expected Annualized Quarterly	Growth Years	Growth Year	Growth Year	Growth Year	Growth Year	Growth Year	Growth in Perpetuity	Cost of Equity
Company Name	Dividend	1-5	6	7	8	9	10		
Cheniere Energy PTRS	3.28	4.00%	3.97%	3.94%	3.91%	3.88%	3.85%	3.80%	10.02%
Devon Energy	0.96	9.50%	8.55%	7.60%	6.65%	5.70%	#VALUE!	3.80%	NA
Enbridge, Inc.	3.80	2.50%	2.72%	2.94%	3.16%	3.38%	3.60%	3.80%	12.52%
Enterprise Products	2.20	10.00%	8.97%	7.94%	6.91%	5.88%	4.85%	3.80%	13.85%
EOG Resources	4.00	11.00%	9.80%	8.60%	7.40%	6.20%	5.00%	3.80%	9.11%
Exxon Mobil Corp.	4.00	3.00%	3.13%	3.26%	3.39%	3.52%	3.65%	3.80%	7.40%
Hess Midstream	3.05	9.00%	8.13%	7.26%	6.39%	5.52%	4.65%	3.80%	15.16%
Kinder Morgan, Inc.	1.20	6.00%	5.63%	5.26%	4.89%	4.52%	4.15%	3.80%	9.07%
Marathon Petroleum	3.70	6.00%	5.63%	5.26%	4.89%	4.52%	4.15%	3.80%	6.91%
National Fuel Gas	2.04	3.00%	3.13%	3.26%	3.39%	3.52%	3.65%	3.80%	7.09%
Oneok, Inc	4.10	4.00%	3.97%	3.94%	3.91%	3.88%	3.85%	3.80%	7.97%
Ovintiv	1.32	10.00%	8.97%	7.94%	6.91%	5.88%	4.85%	3.80%	8.77%
Phillips 66	4.70	6.00%	5.63%	5.26%	4.89%	4.52%	4.15%	3.80%	8.49%
Valero Energy	4.26	2.00%	2.30%	2.60%	2.90%	3.20%	3.50%	3.80%	6.92%
Western Midstream	3.55	12.50%	11.05%	9.60%	8.15%	6.70%	5.25%	3.80%	18.15%
Williams Co, Inc.	2.02	4.50%	4.38%	4.26%	4.14%	4.02%	3.90%	3.80%	7.80%
								Average:	9.70%
								Median:	8.92%
								Cost of Equity Capital - DCF Ke Estimate:	9.70%

Data Source:

Column (1) = Value Line

Column (2) = Value Line average estimated growth rates.

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

Column (8) = Long Term Projected GDP Growth Rate and PCE Inflation Projections from U.S. Federal Reserve.

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Cost of Capital Study
January 1, 2025
Support for Market Multiples

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)				
		(1)	(2)	
Company Name	Ticker	Stock Price	Earnings	P/E Multiple
Cheniere Energy PTRS	CQP	55.40	4.35	12.74
Devon Energy	DVN	33.22	4.80	6.92
Enbridge, Inc.	ENB.TO	42.17	2.75	15.33
Enterprise Products	EPD	31.78	2.70	11.77
EOG Resources	EOG	121.07	11.65	10.39
Exxon Mobil Corp.	XOM	109.57	8.05	13.61
Hess Midstream	HESM	36.58	2.45	14.93
Kinder Morgan, Inc.	KMI	27.10	1.15	23.57
Marathon Petroleum	MPC	142.29	10.75	13.24
National Fuel Gas	NFG	60.93	5.01	12.16
Oneok, Inc	OKE	103.28	5.00	20.66
Ovintiv	OVV	40.41	6.10	6.62
Phillips 66	PSX	119.20	6.00	19.87
Valero Energy	VLO	126.02	8.50	14.83
Western Midstream	WES	39.26	4.00	9.82
Williams Co, Inc.	WMB	54.65	2.00	27.33
Mean:				14.61
Median:				13.43
P/E Estimate:				15.00
Equity Rate:				6.67%
Data Source:				
(1) NASDAQ, 12-30-2024 December, 2024 30-Day Average				
(2) Value Line Industry Summary & Index, 11-22-2024				

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Cost of Capital Study
January 1, 2025
Direct Debt Rate Calculation

Fluid/Natural Gas Pipeline Industries (SIC 4612/4922)	
Direct Capitalization Debt Rate	
Interest Expense (\$ mil)	\$ 31,054
Total Value of Debt (TVD) (\$ mil)	\$ 309,644
Current Yield = Interest Expense/TVD	10.03%
Data Source: Value Line Investment Survey, 11-22-2024	



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Cost of Capital Study
January 1, 2025
Staff Recommendation

Railroad Class I Industry (SIC 4011)				Reference
Equity:				
Risk Adjusted Models				
	CAPM		10.74%	Page 5
Dividend Growth Models				
		DGM or DCF Model (Dividend Growth)	10.25%	Page 7
		DGM or DCF Model (Earnings Growth)	10.50%	Page 7
		DGM or DCF Model (b * ROE = Growth)	16.00%	Page 7
		Multi Stage DCF	6.50%	Page 8
	Average		10.80%	
Estimated Cost of Equity Capital			12.43%	
Debt:				
Estimated Cost of Debt Capital			5.68%	Page 3
Cost of Capital Summary				
Capital Component	Market Capital Structure	Cost of Capital	Before-Tax Weighted Average Cost of Capital	
Debt	20.00%	5.68%	1.14%	
Equity	80.00%	12.43%	9.94%	
Total	100.00%		11.08%	
		Rounded	11.00%	



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Cost of Capital Study
January 1, 2025
Staff Recommendation

Railroad Non-Class I Industry (SIC 4013)				Reference
Equity:				
Risk Adjusted Models				
	CAPM		10.74%	Page 5
Dividend Growth Models				
		DGM or DCF Model (Dividend Growth)	10.25%	Page 7
		DGM or DCF Model (Earnings Growth)	10.50%	Page 7
		DGM or DCF Model (b * ROE = Growth)	16.00%	Page 7
		Multi Stage DCF	6.50%	Page 8
	Average		10.80%	
Estimated Cost of Equity Capital			12.69%	
Debt:				
Estimated Cost of Debt Capital			5.68%	Page 3
Cost of Capital Summary				
Capital Component	Market Capital Structure	Cost of Capital	Before-Tax Weighted Average Cost of Capital	
Debt	20.00%	5.68%	1.14%	
Equity	80.00%	12.69%	10.15%	
Total	100.00%		11.29%	
		Rounded	11.25%	



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Cost of Capital Study January 1, 2025 Staff Recommendation

Railroad Class I Industry (SIC 4011)				Reference
Direct Rate				
Equity:				
<u>Estimated Cost of Equity Capital</u>			4.88%	Page 9
Debt:				
<u>Estimated Cost of Debt Capital</u>			4.12%	Page 10
Cost of Capital Summary				
<u>Capital Component</u>	<u>Market Capital Structure</u>	<u>Cost of Capital</u>	<u>Before-Tax Weighted Average Cost of Capital</u>	
Debt	20.00%	4.12%	0.82%	
Equity	<u>80.00%</u>	4.88%	<u>3.90%</u>	
Total	<u>100.00%</u>		<u>4.72%</u>	
		Rounded	<u>4.75%</u>	

Cost of Capital Study
January 1, 2025
Analysis of Debt Capital

Railroad Class I Industry (SIC 4011)				
			Ratings	
Company	Ticker		Moody's	S&P
Canadian National Railway	CNI		A2	A-
Canadian Pacific Kansas City	CP		Baa2	BBB+
CSX Corp.	CSX		A3	BBB+
Norfolk Southern Corp.	NSC		Baa1	BBB+
Union Pacific Corp.	UNP		A3	A-
Average Rating			A	BBB
NR = Not Rated				
RW = Rating Withdrawn				
Mergent Bond Record, January 2024				
Corporate	Aaa	Aa	A	Baa
October	4.95%	5.17%	5.33%	5.63%
November	5.14%	5.33%	5.49%	5.78%
December	5.20%	5.37%	5.53%	5.80%
Average	5.10%	5.29%	5.45%	5.74%
Public Utilities	Aaa	Aa	A	Baa
October	-	5.29%	5.41%	5.61%
November	-	5.43%	5.55%	5.75%
December	-	5.45%	5.58%	5.77%
Average	-	5.39%	5.51%	5.71%
Industrials	Aaa	Aa	A	Baa
October	4.95%	5.05%	5.24%	5.65%
November	5.14%	5.23%	5.43%	5.80%
December	5.20%	5.28%	5.47%	5.83%
Average	5.10%	5.19%	5.38%	5.76%
Debt Yield Rate Estimate				5.68%
Data Sources:				
https://www.moodys.com				
https://standardandpoors.com				
Mergent Bond Record, January 2025				

Ratings				
Dispersions & Averages Number of Companies				
Agency				
S&P				
AAA	1			
AA	2			
A	3	2	6	
BBB	4	3	12	
BB	5			
B	6			
CCC	7			
C	9			
D	10			
Total		5	18	
Average Rating:			3.60	
Agency				
Moody's				
Aaa	1			
Aa	2			
A	3	3	9	
Baa	4	2	8	
Ba	5			
B	6			
Caa	7			
Ca	8			
C	9			
Total		5	17	
Average Rating:			3.40	

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Cost of Capital Study January 1, 2025 Analysis of the Market Capital Structure

Railroad Class I Industry (SIC 4011)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Company Name	Stock Symbol	Debt (\$ mil)	Debt %	Stock Price	Shares (mil) Outstanding	Equity (\$ mil)	Equity %	Total Capital (\$ mil)
Canadian National Railway	CNI	15,300	18.89%	104.46	628.80	65,684	81.11%	80,984
Canadian Pacific Kansas City	CP	16,199	18.97%	74.13	933.34	69,189	81.03%	85,388
CSX Corp.	CSX	18,541	22.36%	33.38	1,928.42	64,371	77.64%	82,912
Norfolk Southern Corp.	NSC	17,199	23.52%	247.24	226.24	55,936	76.48%	73,135
Union Pacific Corp.	UNP	31,413	18.28%	231.61	606.26	140,416	81.72%	171,829
Mean:		19,730	20.40%			79,119.20	79.60%	98,850
Median:		17,199	18.97%			65,684.00	81.03%	82,912
Market Capital Structure Estimate:		Debt:	20.00%			Equity:	80.00%	
Data Source:								
Columns (1) & (4), Value Line Industry Summary & Index, 11-15-2024								
Column (2) = Column (1) / Column (7)								
Column (3), NASDAQ, 12-30-2024								
Column (5) = Column (3) * Column (4)								
Column (7) = Column (1) + Column (5)								

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Cost of Capital Study
January 1, 2025
Capital Asset Pricing Model (CAPM)

$$\text{CAPM} \implies K_e = R_f + \beta (\text{ERP})$$

Railroad Class I Industry (SIC 4011)	
Risk-Free Rate	4.58%
Beta (β)	1.00
Equity Risk Premium (ERP): $(R_m - R_f)^*$	6.16%
Adjusted Equity Risk Premium: $(\beta * \text{ERP})$	6.16%
Cost of Equity Capital - CAPM	10.74%
U.S. Department of the Treasury, Daily Treasury Yield Curve Rates, Selected Yields	
U.S. Treasury Securities:	
2024 December - 30 Day	4.58%
2024 November - 60 Day	4.56%
2024 October - 90 Day	4.49%
Risk-Free Rate of Return R_f, 30-year Treasury Rate. 2024 December - 30 Day Average.	4.58%
* Equity Risk Premium = Average of 7.31% (historical) and 5.00% (Kroll's Recommended)	

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Cost of Capital Study

January 1, 2025

Beta (β) Analysis

Railroad Class I Industry (SIC 4011)			
Company Name	Stock Symbol		Beta " β "
Canadian National Railway	CNI		0.90
Canadian Pacific Kansas City	CP		0.95
CSX Corp.	CSX		1.00
Norfolk Southern Corp.	NSC		1.05
Union Pacific Corp.	UNP		1.00
Mean:			0.98
Median:			1.00
Beta (β) Estimate:			1.00
Data Source: Value Line Industry Summary & Index, 11-15-2024			

Cost of Capital Study
January 1, 2025
Dividend Growth Model (DGM or DCF)

DGM or DCF Model ==> $K_e = \frac{D_1}{P_0} + g$ where

K_e = Cost of Equity
 D_1 = Expected Dividends
 P_0 = Current Price
 g = Sustainable Growth

Railroad Class I Industry (SIC 4011)												
		(1)	(2)			(3)	(4)	(5)	(6)			
Company Name	Stock Symbol	Stock Price P_0	Expected Dividend D_1	Dividend Yield (D_1 / P_0)	Dividend Growth g	Earnings Growth g				(Dividends) K_e	(Earnings) K_e	$g=(b * ROE)$ K_e
							b	ROE	$g=(b * ROE)$			
Canadian National Railway	CNI	104.46	2.68	2.57%	8.50%	7.00%	54.00%	23.00%	12.42%	11.07%	9.57%	14.99%
Canadian Pacific Kansas City	CP	74.13	0.64	0.86%	9.00%	8.00%	82.00%	9.00%	7.38%	9.86%	8.86%	8.24%
CSX Corp.	CSX	33.38	0.52	1.56%	12.50%	9.00%	74.00%	27.00%	19.98%	14.06%	10.56%	21.54%
Norfolk Southern Corp.	NSC	247.24	5.60	2.27%	5.00%	11.50%	53.00%	17.50%	9.28%	7.27%	13.77%	11.55%
Union Pacific Corp.	UNP	231.61	5.48	2.37%	6.00%	8.00%	52.00%	41.00%	21.32%	8.37%	10.37%	23.69%
Mean:				1.93%	8.20%	8.70%	63.00%	23.50%	14.08%	10.13%	10.63%	16.00%
Median:				2.27%	8.50%	8.00%	54.00%	23.00%	12.42%	9.86%	10.37%	14.99%
Cost of Equity Capital - DCF K_e Estimate:										10.25%	10.50%	16.00%
Notes:												
b = (1 - payout ratio) = Retention Ratio												
ROE = Return on Book Equity												
Not Meaningful (NMF)												
Data Source:												
Column (1), NASDAQ, December Closing Average												
Columns (2) - (6), Value Line Industry Summary & Index, 11-15-2024												

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Cost of Capital Study

January 1, 2025

Multiple-Stage Discounted Cash Flow (DCF) Estimated Cost of Common Equity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Annualized Quarterly	Growth Years	Growth Year	Growth Year	Growth Year	Growth Year	Growth Year	Growth in Perpetuity	Cost of Equity
Company Name	Dividend	1-5	6	7	8	9	10		
Canadian National Railway	\$2.60	8.50%	7.72%	6.94%	6.16%	5.38%	4.60%	3.80%	7.29%
Canadian Pacific Railway	\$0.64	9.00%	8.13%	7.26%	6.39%	5.52%	4.65%	3.80%	4.93%
CSX Corp.	\$0.52	12.50%	11.05%	9.60%	8.15%	6.70%	5.25%	3.80%	6.62%
Norfolk Southern Corp.	\$5.60	5.00%	4.80%	4.60%	4.40%	4.20%	4.00%	3.80%	6.33%
Union Pacific Corp.	\$5.48	6.00%	5.63%	5.26%	4.89%	4.52%	4.15%	3.80%	6.62%
								Average:	6.36%
								Median:	6.62%
Cost of Equity Capital - DCF Estimates:									6.50%
Data Source:									
Column (1) = Value Line									
Column (2) = Value Line Average Estimated Growth Rates									
Columns (3) - (7) = Linear Reduction of Short-term Growth Rate Projections to Sustainable Level									
Column (8) = Long Term Projected GDP Growth Rate Projections from U.S. Federal Reserve									

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Cost of Capital Study January 1, 2025 Support for Market Multiples

Railroad Class I Industry (SIC 4011)				
		(1)	(2)	
Company Name	Ticker	Stock Price	Earnings	P/E Multiple
Canadian National Railway	CNI	104.46	5.50	18.99
Canadian Pacific Kansas City	CP	74.13	3.25	22.81
CSX Corp.	CSX	33.38	1.85	18.04
Norfolk Southern Corp.	NSC	247.24	11.50	21.50
Union Pacific Corp.	UNP	231.61	11.00	21.06
Mean				20.48
Median				21.06
P/E Estimate				20.50
Equity Rate				4.88%
Data Source: Column (1) NASDAQ, December Closing Average Column (2) Value Line Industry Summary & Index, 11-15-2024				

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Cost of Capital Study
January 1, 2025
Direct Debt Rate Calculation

Railroad Class I (SIC 4011)	
Direct Capitalization Debt Rate	
Interest Expense (\$ mil)	\$ 3,808
Total Value of Debt (TVD) (\$ mil)	\$ 92,533
Current Yield = Interest Expense/TVD	4.12%
Data Source: Value Line Investment Survey, 11-15-2024	



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Cost of Capital Study
January 1, 2025
Staff Recommendation

Telecommunications Industry (SIC 4813)				Reference
Equity:				
Risk Adjusted Models				
	CAPM		9.82%	Page 5
Dividend Growth Models				
	DGM or DCF Model (Dividend Growth)		11.80%	Page 7
	DGM or DCF Model (Earnings Growth)		12.30%	Page 7
	DGM or DCF Model (b * ROE = Growth)		12.00%	Page 7
	Multi Stage DCF		8.50%	Page 8
	Average		10.88%	
Estimated Cost of Equity Capital			15.03%	
Debt:				
Estimated Cost of Debt Capital			6.50%	Page 3
Cost of Capital Summary				
Capital Component	Market Capital Structure	Cost of Capital	Before-Tax Weighted Average Cost of Capital	
Debt	50.00%	6.50%	3.25%	
Equity	50.00%	15.03%	7.52%	
Total	100.00%		10.77%	
		Rounded	10.75%	



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Cost of Capital Study January 1, 2025 Staff Recommendation

Telecommunications Industry (SIC 4813)				Reference
Direct Rate				
Equity:				
	<u>Estimated Cost of Equity Capital</u>	9.09%		Page 9
Debt:				
	<u>Estimated Cost of Debt Capital</u>	4.73%		Page 10
Cost of Capital Summary				
<u>Capital Component</u>	<u>Market Capital Structure</u>	<u>Cost of Capital</u>	<u>Before-Tax Weighted Average Cost of Capital</u>	
Debt	50.00%	4.73%	2.37%	
Equity	50.00%	9.09%	4.55%	
Total	100.00%		6.92%	
		Rounded	6.85%	

Cost of Capital Study
January 1, 2025
Analysis of Debt Capital

Telecommunications Industry (SIC: 4813)				
Ratings				
Company	Ticker		Moody's	S&P
AT&T	T		Baa2	BBB
Cable One	CABO		Ba3	BB
Comcast Corporation	CMCSA		A3	A-
Deutsche Telekom	DTEGY		Baa1	BBB+
Lumen Technologies	LUMN		Caa1	CCC+
Shenandoah Telecommunications	SHEN		NPS	AA
Verizon Communications	VZ		Baa1	BBB+
Average Rating			Baa	BBB
NR = Not Rated				
RW = Rating Withdrawn				
Mergent Bond Record, January 2024				
Corporate	Aaa	Aa	A	Baa
October	4.95%	5.17%	5.33%	5.63%
November	5.14%	5.33%	5.49%	5.78%
December	5.20%	5.37%	5.53%	5.80%
Average	5.10%	5.29%	5.45%	5.74%
Public Utilities	Aaa	Aa	A	Baa
October	-	5.29%	5.41%	5.61%
November	-	5.43%	5.55%	5.75%
December	-	5.45%	5.58%	5.77%
Average	-	5.39%	5.51%	5.71%
Industrials	Aaa	Aa	A	Baa
October	4.95%	5.05%	5.24%	5.65%
November	5.14%	5.23%	5.43%	5.80%
December	5.20%	5.28%	5.47%	5.83%
Average	5.10%	5.19%	5.38%	5.76%
Debt Yield Rate Estimate				6.50%
Data Source:				
https://www.moodys.com				
https://standardandpoors.com				
Mergent Bond Record, January 2025				

Ratings				
Dispersions & Averages Number of Companies				
Agency				
S&P				
AAA	1			
AA	2	1		
A	3	1	3	
BBB	4	2	8	
BB	5	1	5	
B	6			
CC	8	1	8	
C	9			
D	10			
Total		6	24	
Average Rating:			4.00	
Agency				
Moody's				
Aaa	1			
Aa	2			
A	3	1	3	
Baa	4	2	8	
Ba	5	1	5	
B	6			
Caa	7	1	7	
Ca	8			
C	9			
Total		5	23	
Average Rating:			4.60	

Cost of Capital Study
January 1, 2025
Analysis of the Market Capital Structure

Telecommunications Industry (SIC 4813)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Company Name	Ticker Symbol	Debt (\$ mil)	Debt %	Stock Price	Shares (mil) Outstanding	Equity (\$ mil)	Equity %	Total Capital (\$ mil)
AT&T	T	129,012	43.75%	23.12	7,175	165,886	56.25%	294,898
Cable One	CABO	3,488	61.91%	382.48	5.61	2,146	38.09%	5,634
Comcast Corporation	CMCSA	101,364	40.07%	39.61	3,827	151,588	59.93%	252,952
Deutsche Telekom	DTEGY	120,200	44.05%	30.99	4,927	152,688	55.95%	272,888
Lumen Technologies	LUMN	18,554	74.80%	6.16	1,015	6,252	25.20%	24,806
Shenandoah Telecommunications	SHEN	344.50	32.20%	13.18	55	725	67.76%	1,070
Mean:		74,801	49.46%			93,302	50.53%	168,103
Median:		101,364	43.90%			151,588	56.10%	252,952
Market Capital Structure Estimate:		Debt:	50.00%			Equity:	50.00%	
Data Source: Columns (1) & (4), Value Line Industry Summary & Index, 12-06-2024 Column (2) = Column (1) / Column (7) Column (3), NASDAQ, 12-30-2024 Column (5) = Column (3) * Column (4) Column (7) = Column (1) + Column (5)								

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Cost of Capital Study
January 1, 2025
Capital Asset Pricing Model (CAPM)

$$\text{CAPM} \implies K_e = R_f + (\beta * \text{ERP})$$

Telecommunications Industry (SIC 4813)	
Risk-Free Rate (R_f)	4.58%
Beta (β)	0.85
Equity Risk Premium (ERP): ($R_m - R_f$)	6.16%
Adjusted Equity Risk Premium: ($\beta * \text{ERP}$)	5.24%
Cost of Equity Capital - CAPM	9.82%
U.S. Department of the Treasury, Daily Treasury Yield Curve Rates, Selected Yields	
U.S. Treasury Securities:	
2024 December - 30 Day	4.58%
2024 November - 60 Day	4.56%
2024 October - 90 Day	4.49%
Risk-Free Rate of Return R_f, 30-year Treasury Rate. 2024 December - 30 Day Average.	4.58%
* Equity Risk Premium = Average of 7.31% (historical) and 5.00% (Kroll's Recommended)	

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Cost of Capital Study

January 1, 2025

Beta (β) Analysis

Telecommunications Industry (SIC 4813)		
Company Name	Ticker Symbol	Beta " β "
AT&T	T	0.80
Cable One	CABO	1.00
Comcast Corporation	CMCSA	0.85
Deutsche Telekom	DTEGY	0.85
Lumen Technologies	LUMN	1.15
Shenandoah Telecommunications	SHEN	0.85
	Mean:	0.94
	Median:	0.85
	Beta (β) Estimate:	0.85
Data Source: Value Line Industry Summary & Index, 12-06-2024		

Cost of Capital Study
 January 1, 2025
 Dividend Growth Model (DGM or DCF)

DGM or DCF Model ==> $K_e = \frac{D_1}{P_0} + g$

where
 K_e = Cost of Equity
 D_1 = Expected Dividends
 P_0 = Current Price
 g = Sustainable Growth

Telecommunications Industry (SIC 4813)												
Company Name	Ticker Symbol	(1)	(2)	Dividend Yield (D_1 / P_0)	Dividend Growth g	EPS Growth g	(5) (6)			(Dividends) K_e	(Earnings) K_e	$g=(b * ROE)$ K_e
		Stock Price P_0	Expected Dividend D_1				b	ROE	$g=(b * ROE)$			
AT&T	T	23.12	1.11	4.80%	-3.50%	4.00%	55.00%	14.50%	7.98%	NMF	8.80%	12.78%
Cable One	CABO	382.48	12.50	3.27%	2.50%	1.00%	66.00%	10.50%	6.93%	5.77%	4.27%	10.20%
Comcast Corporation	CMCSA	39.61	1.31	3.31%	8.50%	9.00%	71.00%	20.00%	14.20%	11.81%	12.31%	17.51%
Deutsche Telekom	DTEGY	30.99	0.85	2.74%	12.50%	15.50%	56.00%	15.00%	8.40%	15.24%	18.24%	11.14%
Lumen Technologies	LUMN	6.16	NMF	NMF	NMF	-8.50%	NMF	NMF	NMF	NMF	NMF	NMF
Shenandoah Telecommunications	SHEN	13.18	0.11	0.83%	12.00%	39.00%	NMF	NMF	NMF	NMF	39.83%	NMF
Mean:				0.96%	6.40%	10.00%	57.80%	15.80%	9.06%	10.94%	16.69%	12.91%
Median:				3.27%	8.50%	6.50%	56.00%	15.00%	7.98%	11.81%	12.31%	11.96%
Cost of Equity Capital - DCF K_e Estimate:										11.80%	12.30%	12.00%

Notes:
 b = (1 - payout ratio) = Retention Ratio
 ROE = Return on Book Equity
 Not Meaningful (NMF)
Data Source:
 Column (1), NASDAQ, 12-30-2024
 Columns (2) - (6), Value Line Industry Summary & Index, 12-06-2024

Cost of Capital Study

January 1, 2025

Multiple-Stage Discounted Cash Flow (DCF) Estimated Costs of Common Equity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Expected Annualized Quarterly	Growth Years	Growth Year	Growth Year	Growth Year	Growth Year	Growth Year	Growth in Perpetuity	Cost of Equity
Company Name	Dividend	1-5	6	7	8	9	10		
AT&T	1.11	-3.50%	-2.28%	-1.06%	0.16%	1.38%	2.60%	3.80%	NMF
Cable One	12.5	2.50%	2.72%	2.94%	3.16%	3.38%	3.60%	3.80%	6.91%
Comcast Corporation	1.31	8.50%	7.72%	6.94%	6.16%	5.38%	4.60%	3.80%	8.39%
Deutsche Telekom	0.85	12.50%	11.05%	9.60%	8.15%	6.70%	5.25%	3.80%	8.68%
Lumen Technologies	NMF	NMF	NMF	NMF	NMF	NMF	NMF	3.80%	NMF
Shenandoah Telecommunications	0.11	12.00%	10.63%	9.26%	7.89%	6.52%	5.15%	3.80%	NMF
								Mean:	7.99%
								Median:	8.39%
								Cost of Equity Capital - DCF Ke Estimate:	8.50%

Data Source:

Column (1) = Value Line

Column (2) = Value Line average estimated growth rates.

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

Column (8) = Long Term Projected GDP Growth Rate Projections from U.S. Federal Reserve.

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Cost of Capital Study

January 1, 2025

Market Multiples

Telecommunications Industry (SIC 4813)				
		(1)	(2)	
Company Name	Ticker	Stock Price	EPS	P/E Multiple
AT&T	T	23.12	2.25	10.28
Cable One	CABO	382.48	35.10	10.90
Comcast Corporation	CMCSA	39.61	4.25	9.32
Deutsche Telekom	DTEGY	30.99	1.85	16.75
Lumen Technologies	LUMN	6.16	0.20	30.80
Shenandoah Telecommunications	SHEN	13.18	0.35	37.66
Mean:				19.29
Median:				13.83
P/E Estimate:				11.00
Equity Rate:				9.09%
Data Source: Column (1) NASDAQ, 12-30-2024 Column (2) Value Line Industry Summary & Index, 12-06-2024				

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Cost of Capital Study January 1, 2025 Direct Debt Rate Calculation

Telecommunications Industry (SIC 4813)	
Direct Capitalization Debt Rate	
Interest Expense (\$ mil)	\$ 22,852
Total Value of Debt (TVD) (\$ mil)	\$ 483,354
Current Yield = Interest Expense/TVD	4.73%
Data Source: Value Line Investment Survey, 12-06-2024	