KWalton

^DJU 732.82 1.21 0.17 %   Dow Jones Utility Average - Y
10/25/17   12:34 PM

(•) US Markets close in 4 hrs and 3 mins

S&P 500	Dow 30	Nasdaq
2,504.16	22,386.38	6,432.76
-4.08 (-0.16%)	-26.21 (-0.12%)	-23.29 (-0.36%)

Dow Jones Utility Average (^DJU)

DJI - DJI Real Time Price. Currency in USD

In watchlist

Quote Lookup

732.76 +1.15 (+0.16%)

As of 11:58AM EDT. Market open.

Summary Conversations Options Components **Historical Data**

Time Period: Jan 01, 2016 - Sep 21, 2017 Show: Historical Prices

Frequency: Monthly Apply

Currency in USD Download Data

Date	Open	High	Low	Close*	Adj Close**	Volume
Sep 01, 2017	743.84	755.37	728.53	731.61	731.61	5,529,600
Aug 01, 2017	726.96	750.32	722.95	743.24	743.24	8,298,100
Jul 01, 2017	708.55	728.03	697.76	726.48	726.48	8,127,400
Jun 01, 2017	726.30	738.82	704.53	706.91	706.91	9,489,000
May 01, 2017	705.17	728.98	691.40	726.62	726.62	9,749,400
Apr 01, 2017	696.69	711.47	691.11	704.35	704.35	8,304,300
Mar 01, 2017	697.83	710.00	683.44	697.28	697.28	10,347,200
Feb 01, 2017	663.92	704.96	654.14	703.16	703.16	8,947,800
Jan 01, 2017	660.03	669.10	648.34	668.87	668.87	8,464,100
Dec 01, 2016	630.15	665.93	622.88	645.86	645.86	9,693,300
Nov 01, 2016	674.91	675.03	616.19	632.67	632.67	3,373,100
Oct 01, 2016	667.33	679.09	638.22	675.23	675.23	2,804,900
Sep 01, 2016	666.55	698.58	655.98	668.13	668.13	3,025,800
Aug 01, 2016	710.33	712.65	662.38	666.87	666.87	2,997,800

Jul 01, 2016	718.05	723.83	699.03	711.42	711.42	2,667,000
Jun 01, 2016	658.49	716.57	654.59	716.52	716.52	3,338,400
May 01, 2016	654.98	672.40	635.98	659.44	659.44	3,031,700
Apr 01, 2016	667.45	672.28	630.68	654.44	654.44	2,825,000
Mar 01, 2016	623.13	669.46	607.58	668.57	668.57	3,725,100
Feb 01, 2016	610.96	637.93	606.14	620.70	620.70	3,796,100
Jan 01, 2016	574.51	611.91	569.12	611.35	611.35	3,493,900

*Close price adjusted for splits. **Adjusted close price adjusted for both dividends and splits.

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2017 September Bond Record Corporate Yields.pdf
10/25/17 12:35 PM

Corporate Bond Yield Averages

		CORPORATE BY RATINGS				CORPORATE BY GROUPS				PUBLIC UTILITY BONDS					INDUSTRIAL BONDS					RAILROAD BONDS			
	AV. CORP.	Aaa	Aa	A	Baa	P.U.	IND.	R.R.		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa
2011																							
Jan.	5.56	5.04	5.26	5.53	6.09	5.64	5.46	----	Jan.	----	5.29	5.57	6.06	Jan.	5.04	5.22	5.48	6.11	Jan.	----	----	----	----
Feb.	5.66	5.22	5.37	5.64	6.15	5.73	5.58	----	Feb.	----	5.42	5.68	6.10	Feb.	5.22	5.31	5.59	6.19	Feb.	----	----	----	----
Mar.	5.55	5.13	5.28	5.52	6.03	5.62	5.48	----	Mar.	----	5.33	5.56	5.97	Mar.	5.13	5.22	5.48	6.09	Mar.	----	----	----	----
Apr.	5.56	5.16	5.29	5.52	6.02	5.62	5.49	----	Apr.	----	5.32	5.55	5.98	Apr.	5.16	5.25	5.48	6.06	Apr.	----	----	----	----
May	5.33	4.96	5.06	5.29	5.78	5.38	5.27	----	May	----	5.08	5.32	5.74	May	4.96	5.04	5.26	5.81	May	----	----	----	----
June	5.30	4.99	5.04	5.26	5.75	5.33	5.27	----	June	----	5.04	5.26	5.67	June	4.99	5.02	5.25	5.82	June	----	----	----	----
July	5.30	4.93	5.03	5.26	5.76	5.34	5.25	----	July	----	5.05	5.27	5.70	July	4.93	4.99	5.25	5.81	July	----	----	----	----
Aug.	4.79	4.37	4.47	4.74	5.36	4.78	4.79	----	Aug.	----	4.44	4.69	5.22	Aug.	4.37	4.50	4.79	5.49	Aug.	----	----	----	----
Sept.	4.60	4.09	4.23	4.54	5.27	4.61	4.58	----	Sept.	----	4.24	4.48	5.11	Sept.	4.09	4.21	4.59	5.42	Sept.	----	----	----	----
Oct.	4.60	3.98	4.16	4.54	5.37	4.66	4.54	----	Oct.	----	4.21	4.52	5.24	Oct.	3.98	4.11	4.56	5.50	Oct.	----	----	----	----
Nov.	4.39	3.87	3.97	4.34	5.14	4.37	4.41	----	Nov.	----	3.92	4.25	4.93	Nov.	3.87	4.01	4.43	5.34	Nov.	----	----	----	----
Dec.	4.47	3.93	4.03	4.40	5.25	4.47	4.47	----	Dec.	----	4.00	4.33	5.07	Dec.	3.93	4.06	4.46	5.43	Dec.	----	----	----	----
2012																							
Jan.	4.45	3.85	4.01	4.39	5.23	4.48	4.41	----	Jan.	----	4.03	4.34	5.06	Jan.	3.85	3.98	4.43	5.39	Jan.	----	----	----	----
Feb.	4.42	3.85	3.99	4.39	5.14	4.47	4.37	----	Feb.	----	4.02	4.36	5.02	Feb.	3.85	3.96	4.41	5.26	Feb.	----	----	----	----
Mar.	4.54	3.99	4.14	4.51	5.23	4.59	4.50	----	Mar.	----	4.16	4.48	5.13	Mar.	3.99	4.12	4.53	5.33	Mar.	----	----	----	----
Apr.	4.49	3.96	4.08	4.44	5.19	4.53	4.44	----	Apr.	----	4.10	4.40	5.11	Apr.	3.96	4.06	4.48	5.27	Apr.	----	----	----	----
May	4.33	3.80	3.91	4.26	5.07	4.36	4.30	----	May	----	3.92	4.20	4.97	May	3.80	3.90	4.32	5.17	May	----	----	----	----
June	4.22	3.64	3.78	4.14	5.02	4.26	4.18	----	June	----	3.79	4.08	4.91	June	3.64	3.77	4.18	5.13	June	----	----	----	----
July	4.03	3.40	3.54	3.93	4.87	4.12	3.93	----	July	----	3.58	3.93	4.85	July	3.40	3.49	3.93	4.89	July	----	----	----	----
Aug.	4.09	3.48	3.61	3.99	4.91	4.18	3.99	----	Aug.	----	3.65	4.00	4.88	Aug.	3.48	3.57	3.98	4.93	Aug.	----	----	----	----
Sept.	4.09	3.49	3.68	4.01	4.84	4.17	4.00	----	Sept.	----	3.69	4.02	4.81	Sept.	3.49	3.66	4.00	4.87	Sept.	----	----	----	----
Oct.	3.97	3.47	3.63	3.90	4.58	4.05	3.89	----	Oct.	----	3.68	3.91	4.54	Oct.	3.47	3.58	3.89	4.62	Oct.	----	----	----	----
Nov.	3.92	3.50	3.57	3.87	4.51	3.95	3.88	----	Nov.	----	3.60	3.84	4.42	Nov.	3.50	3.54	3.89	4.60	Nov.	----	----	----	----
Dec.	4.05	3.65	3.70	3.98	4.63	4.10	3.99	----	Dec.	----	3.75	4.00	4.56	Dec.	3.65	3.65	3.96	4.70	Dec.	----	----	----	----
2013																							
Jan.	4.19	3.80	3.87	4.14	4.73	4.24	4.14	----	Jan.	----	3.90	4.15	4.66	Jan.	3.80	3.84	4.13	4.81	Jan.	----	----	----	----
Feb.	4.27	3.90	3.95	4.19	4.85	4.29	4.25	----	Feb.	----	3.95	4.18	4.74	Feb.	3.90	3.95	4.20	4.95	Feb.	----	----	----	----
Mar.	4.29	3.93	3.97	4.23	4.85	4.29	4.29	----	Mar.	----	3.95	4.20	4.72	Mar.	3.93	3.98	4.25	4.99	Mar.	----	----	----	----
Apr.	4.07	3.73	3.77	4.03	4.59	4.08	4.07	----	Apr.	----	3.74	4.00	4.49	Apr.	3.73	3.79	4.05	4.69	Apr.	----	----	----	----
May	4.23	3.89	3.94	4.19	4.73	4.24	4.22	----	May	----	3.91	4.17	4.65	May	3.89	3.97	4.20	4.80	May	----	----	----	----
June	4.63	4.27	4.32	4.56	5.19	4.63	4.63	----	June	----	4.27	4.53	5.08	June	4.27	4.36	4.58	5.29	June	----	----	----	----
July	4.76	4.34	4.46	4.69	5.32	4.78	4.74	----	July	----	4.44	4.68	5.21	July	4.34	4.47	4.69	5.43	July	----	----	----	----
Aug.	4.88	4.54	4.63	4.78	5.42	4.85	4.92	----	Aug.	----	4.53	4.73	5.28	Aug.	4.54	4.72	4.83	5.57	Aug.	----	----	----	----
Sept.	4.95	4.64	4.69	4.85	5.47	4.90	4.99	----	Sept.	----	4.58	4.80	5.31	Sept.	4.64	4.80	4.90	5.62	Sept.	----	----	----	----
Oct.	4.82	4.53	4.59	4.73	5.31	4.78	4.86	----	Oct.	----	4.48	4.70	5.17	Oct.	4.53	4.69	4.76	5.44	Oct.	----	----	----	----
Nov.	4.91	4.63	4.67	4.82	5.38	4.86	4.95	----	Nov.	----	4.56	4.77	5.24	Nov.	4.63	4.79	4.85	5.52	Nov.	----	----	----	----
Dec.	4.92	4.62	4.68	4.85	5.38	4.89	4.95	----	Dec.	----	4.59	4.81	5.25	Dec.	4.62	4.76	4.89	5.51	Dec.	----	----	----	----
2014																							
Jan.	4.76	4.49	4.53	4.69	5.19	4.72	4.78	----	Jan.	----	4.44	4.63	5.09	Jan.	4.49	4.62	4.74	5.29	Jan.	----	----	----	----
Feb.	4.68	4.45	4.46	4.60	5.10	4.64	4.71	----	Feb.	----	4.38	4.53	5.01	Feb.	4.45	4.54	4.66	5.19	Feb.	----	----	----	----
Mar.	4.65	4.38	4.44	4.56	5.06	4.63	4.65	----	Mar.	----	4.40	4.51	5.00	Mar.	4.38	4.49	4.60	5.13	Mar.	----	----	----	----
Apr.	4.52	4.24	4.33	4.45	4.90	4.52	4.51	----	Apr.	----	4.30	4.41	4.85	Apr.	4.24	4.36	4.48	4.96	Apr.	----	----	----	----
May	4.38	4.16	4.20	4.31	4.76	4.37	4.40	----	May	----	4.16	4.26	4.69	May	4.16	4.24	4.35	4.83	May	----	----	----	----
June	4.44	4.25	4.26	4.35	4.80	4.42	4.45	----	June	----	4.23	4.29	4.73	June	4.25	4.29	4.41	4.86	June	----	----	----	----
July	4.37	4.16	4.20	4.28	4.73	4.35	4.39	----	July	----	4.16	4.23	4.66	July	4.16	4.23	4.34	4.80	July	----	----	----	----
Aug.	4.29	4.08	4.10	4.20	4.69	4.29	4.30	----	Aug.	----	4.07	4.13	4.65	Aug.	4.08	4.13	4.26	4.72	Aug.	----	----	----	----
Sept.	4.39	4.11	4.19	4.30	4.80	4.40	4.37	----	Sept.	----	4.18	4.24	4.79	Sept.	4.11	4.19	4.35	4.82	Sept.	----	----	----	----
Oct.	4.22	3.92	3.99	4.13	4.69	4.24	4.20	----	Oct.	----	3.98	4.06	4.67	Oct.	3.92	4.00	4.20	4.70	Oct.	----	----	----	----
Nov.	4.28	3.92	4.04	4.18	4.79	4.29	4.26	----	Nov.	----	4.03	4.09	4.75	Nov.	3.92	4.04	4.27	4.82	Nov.	----	----	----	----
Dec.	4.17	3.79	3.89	4.05	4.74	4.18	4.15	----	Dec.	----	3.90	3.95	4.70	Dec.	3.79	3.89	4.15	4.77					
2015																							
Jan.	3.84	3.46	3.54	3.70	4.45	3.83	3.84	----	Jan.	----	3.52	3.58	4.39	Jan.	3.46	3.55	3.82	4.51	Jan.	----	----	----	----
Feb.	3.93	3.61	3.64	3.81	4.51	3.91	3.94	----	Feb.	----	3.62	3.67	4.44	Feb.	3.61	3.65	3.94	4.57	Feb.	----	----	----	----
Mar.	3.98	3.64	3.70	3.85	4.54	3.97	3.97	----	Mar.	----	3.67	3.74	4.51	Mar.	3.64	3.72	3.96	4.56	Mar.	----	----	----	----
Apr.	3.93	3.52	3.64	3.82	4.48	3.96	3.88	----	Apr.	----	3.63	3.75	4.51	Apr.	3.52	3.65	3.89	4.45	Apr.	----	----	----	----
May	4.35	3.98	4.07	4.24	4.89	4.38	4.31	----	May	----	4.05	4.17	4.91	May	3.98	4.09	4.30	4.86	May	----	----	----	----
June	4.56	4.19	4.27	4.45	5.13	4.60	4.52	----	June	----	4.29	4.39	5.13	June	4.19	4.25	4.51	5.12	June	----	----	----	----
July	4.57	4.15	4.25	4.44	5.20	4.63	4.51	----	July	----	4.27	4.40	5.22	July	4.15	4.22	4.49	5.18	July	----	----	----	----
Aug.	4.48	4.04	4.13	4.32	5.19	4.54	4.42	----	Aug.	----	4.13	4.25	5.23	Aug.	4.04	4.11	4.39	5.15	Aug.	----	----	----	----
Sept.	4.59	4.07	4.21	4.43	5.34	4.68	4.49	----	Sept.	----	4.25	4.39	5.42	Sept.	4.07	4.16	4.46	5.25	Sept.	----	----	----	----
Oct.	4.52	3.95	4.11	4.33	5.34	4.63	4.40	----	Oct.	----	4.13	4.29	5.47	Oct.	3.95	4.08	4.37	5.21	Oct.	----	----	----	----
Nov.	4.62	4.06	4.21	4.43	5.46	4.73	4.51	----	Nov.	----	4.22	4.40	5.57	Nov.	4.06	4.20	4.45	5.34	Nov.	----	----	----	----
Dec.	4.58	3.97	4.16	4.38	5.46	4.69	4.47	----	Dec.	----	4.16	4.35	5.55	Dec.	3.97	4.16	4.40	5.36	Dec.	----	----	----	----
2016																							
Jan.	4.56	4.00	4.12	4.35	5.45	4.62	4.50	----	Jan.	----	4.09	4.27	5.49	Jan.	4.00	4.16	4.42	5.40	Jan.	----	----	----	----
Feb.	4.44	3.96	3.98	4.22	5.34	4.44	4.43	----	Feb.	----	3.94	4.11	5.28	Feb.	3.96	4.02	4.33	5.39	Feb.	----	----	----	----
Mar.	4.33	3.82	3.91	4.16	5.13	4.40	4.25	----	Mar.	----	3.93	4.16	5.12	Mar.	3.82	3.89	4.16	5.14	Mar.	----	----	----	----
Apr.	4.09	3.62	3.71	3.98	4.79	4.16	4.01	----	Apr.	----	3.74	4.00	4.75	Apr.	3.62	3.67	3.95	4.82	Apr.	----	----	----	----
May	4.04	3.65	3.70	3.94	4.68	4.06	4.02	----	May	----	3.65	3.93	4.60	May	3.65	3.73	3.95	4.75	May	----	----	----	----
June	3.91	3.50	3.60	3.80	4.53	3.93	3.88	----	June	----	3.56	3.78	4.47	June	3.50	3.63	3.82	4.58	June	----	----	----	----
July	3.67	3.28	3.39	3.58	4.22	3.70	3.64	----	July	----	3.36	3.57	4.16	July	3.28	3.42	3.58	4.27	July	----	----	----	----
Aug.	3.70	3.32	3.42	3.60	4.24	3.73	3.66	----	Aug.	----	3.39	3.59	4.20	Aug.	3.32	3.45	3.61	4.27	Aug.	----	----	----	----
Sept.	3.78	3.41	3.50	3.68	4.31	3.80	3.75	----	Sept.	----	3.47	3.66	4.27	Sept.	3.41	3.53	3.69	4.35	Sept.	----	----	----	----
Oct.	3.87	3.51	3.61	3.78	4.38	3.90	3.84	----	Oct.	----	3.59	3.77	4.34	Oct.	3.51	3.63	3.79	4.40	Oct.	----	----	----	----
Nov.	4.20	3.86	3.94	4.11	4.71	4.21	4.19	----	Nov.	----	3.91	4.08	4.64	Nov.	3.86	3.97	4.14	4.77	Nov.	----	----	----	----
Dec.	4.36	4.06	4.12	4.28	4.83	4.39	4.33	----	Dec.	----	4.11	4.27	4.79	Dec.	4.06	4.13	4.29	4.85	Dec.	----	----	----	----
2017																							
Jan.	4.22	3.92	3.98	4.16	4.66	4.24	4.20	----	Jan.	----	3.96	4.14	4.62	Jan.	3.92	4.00	4.17	4.70	Jan.	----	----	----	----
Feb.	4.23	3.95	4.01	4.18	4.64	4.25	4.21	----	Feb.	----	3.99	4.18	4.58	Feb.	3.95	4.02	4.19	4.70	Feb.	----	----	----	----
Mar.	4.28	4.01	4.06	4.23	4.68	4.30	4.27	----	Mar.	----	4.04	4.23	4.62	Mar.	4.01	4.07	4.23	4.74	Mar.	----	----	----	----
Apr.	4.16	3.87	3.93	4.12	4.57	4.19	4.13	----	Apr.	----	3.93	4.12	4.51	Apr.	3.87	3.92	4.11	4.62	Apr.	----	----	----	----
May	4.15	3.85	3.93	4.11	4.55	4.19	4.12	----	May	----	3.94	4.12	4.50	May	3.85	3.92	4.09	4.60	May	----	----	----	----
June	3.98	3.68	3.78	3.93	4.37	4.01	3.95	----	June	----	3.77	3.94	4.32	June	3.68	3.78	3.92	4.41	June	----	----	----	----
July	4.01	3.70	3.80	3.98	4.39	4.06	3.96	----	July	----	3.82	3.99	4.36	July	3.70	3.78	3.95	4.41	July	----	----	----	----
Aug.	3.92	3.63	3.72	3.88	4.31	3.92	3.92	----	Aug.	----	3.67	3.86	4.23	Aug.	3.63	3.76	3.90	4.38	Aug.	----	----	----	----

Notes: Moody's® Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly-replenished population of over 100 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possible to 30 years, with an average maturity of 28 years. They are dropped from the list if their remaining life falls below 20 years or if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual compounding basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of Aaa -rated railroad term bond issues, Moody's® Aaa railroad bond yield average was discontinued as of December 18, 1967. Moody's® Aaa public utility average was suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.

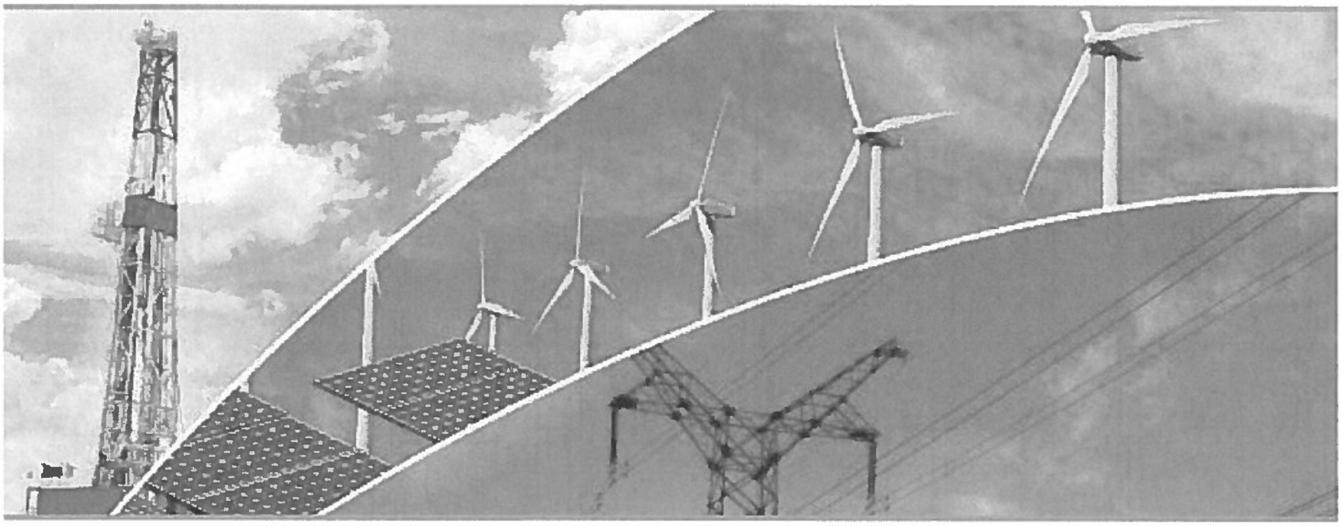
Because of the dearth of Aaa rated public utility bond issues, Moody's® Aaa public utility bond yield average was discontinued as of December 10, 2001.

KWalton

Annual Energy Outlook 2017 with Projections to 2050
10/25/17 12:35 PM

Annual Energy Outlook 2017

with projections to 2050



Independent Statistics & Analysis
U.S. Energy Information Administration

#AEO2017

January 5, 2017
www.eia.gov/aeo

Table of contents

Overview/key takeaways

EIA's Annual Energy Outlook provides modeled projections of domestic energy markets through 2050, and includes cases with different assumptions of macroeconomic growth, world oil prices, technological progress, and energy policies. With strong domestic production and relatively flat demand, the United States becomes a net energy exporter over the projection period in most cases.

The Annual Energy Outlook provides long-term energy projections for the United States

- Projections in the *Annual Energy Outlook 2017* (AEO2017) are not predictions of what will happen, but rather modeled projections of what may happen given certain assumptions and methodologies.

- The AEO is developed using the National Energy Modeling System (NEMS), an integrated model that aims to capture various interactions of economic changes and energy supply, demand, and prices.

- Energy market projections are subject to much uncertainty, as many of the events that shape energy markets and future developments in technologies, demographics, and resources cannot be foreseen with certainty.

- More information about the assumptions used in developing these projections is available shortly after the release of each AEO.

- The AEO is published pursuant to the Department of Energy Organization Act of 1977, which requires the U.S. Energy Information Administration (EIA) Administrator to prepare annual reports on trends and projections for energy use and supply.

What is the Reference case?

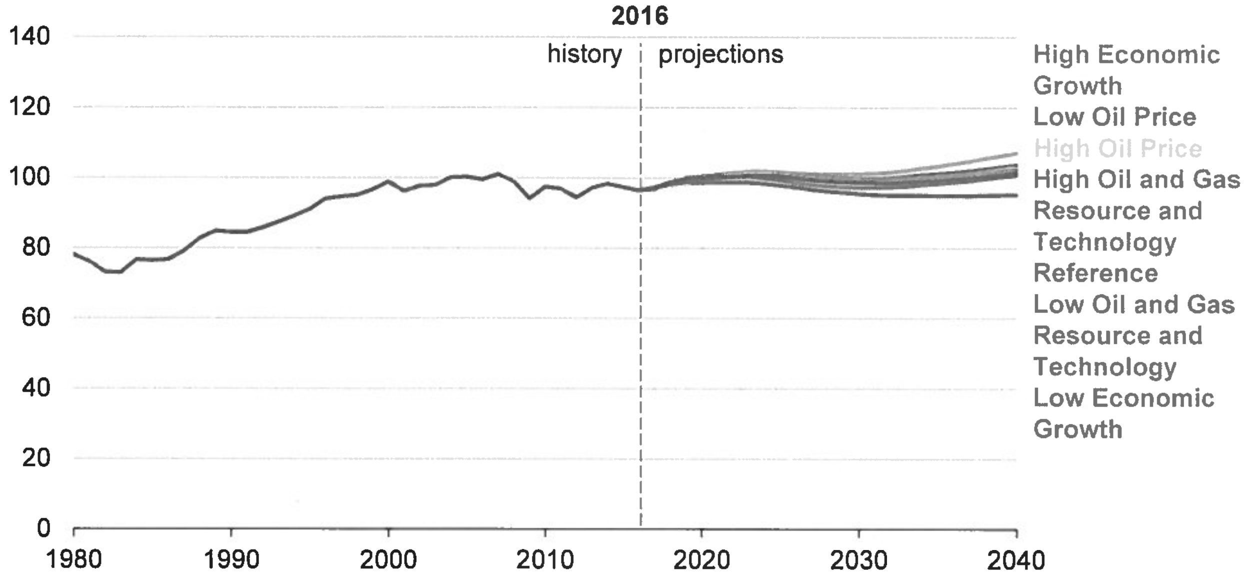
- The Reference case projection assumes trend improvement in known technologies, along with a view of economic and demographic trends reflecting the current central views of leading economic forecasters and demographers.
- It generally assumes that current laws and regulations affecting the energy sector, including sunset dates for laws that have them, are unchanged throughout the projection period.
- The potential impacts of proposed legislation, regulations, or standards are not reflected in the Reference case.
- EIA addresses the uncertainty inherent in energy projections by developing side cases with different assumptions of macroeconomic growth, world oil prices, technological progress, and energy policies.
- Projections in the AEO should be interpreted with a clear understanding of the assumptions that inform them and the limitations inherent in any modeling effort.

What are the side cases?

- Oil prices are driven by global market balances that are mainly influenced by factors external to the NEMS model. In the High Oil Price case, the price of Brent crude in 2016 dollars reaches $226 per barrel (b) by 2040, compared to $109/b in the Reference case and $43/b in the Low Oil Price case.
- In the High Oil and Gas Resource and Technology case, lower costs and higher resource availability than in the Reference case allow for higher production at lower prices. In the Low Oil and Gas Resource and Technology case, more pessimistic assumptions about resources and costs are applied.
- The effects of economic assumptions on energy consumption are addressed in the High and Low Economic Growth cases, which assume compound annual growth rates for U.S. gross domestic product of 2.6% and 1.6%, respectively, from 2016–40, compared with 2.2% annual growth in the Reference case.
- A case assuming that the Clean Power Plan (CPP) is not implemented can be compared with the Reference case to show how the absence of that policy could affect energy markets and emissions.

Energy consumption varies minimally across all AEO cases—

Total energy consumption
quadrillion British thermal units

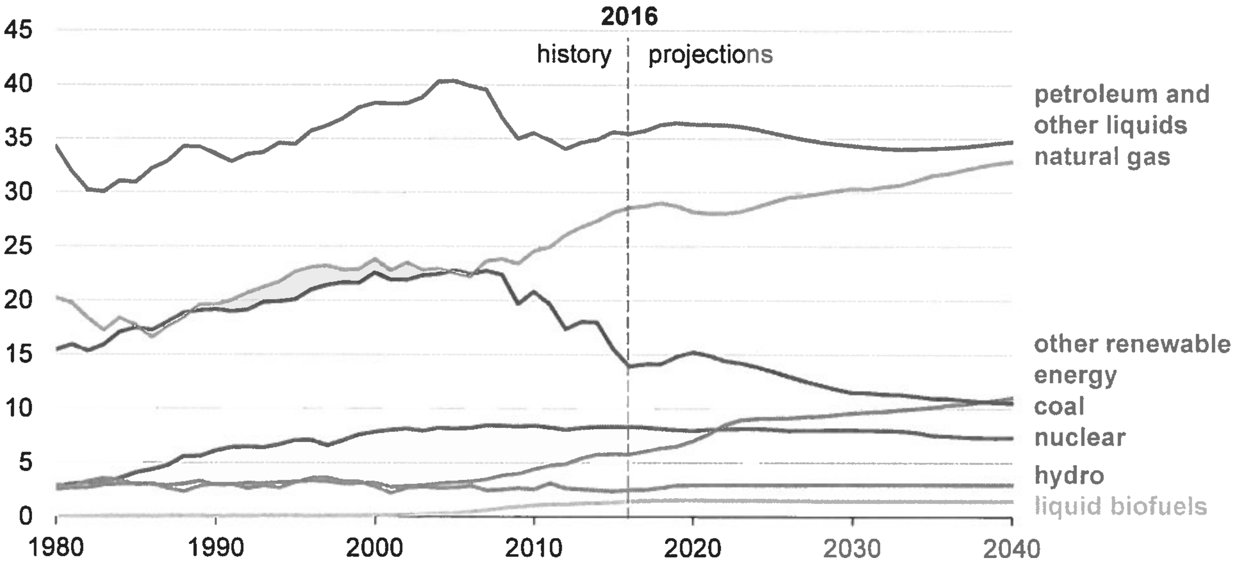


—bounded by the High and Low Economic Growth cases

- In the Reference case, total energy consumption increases by 5% between 2016 and 2040.
- Because a significant portion of energy consumption is related to economic activity, energy consumption is projected to increase by approximately 11% in the High Economic Growth case and to remain nearly flat in the Low Economic Growth case.
- Although the Oil and Gas Resource and Technology cases affect the production of energy, the impact on domestic energy consumption is less significant.
- In all AEO cases, the electric power sector remains the largest consumer of primary energy.
- Projections of total energy consumption (and supply) are sensitive to the conversions used to represent the primary energy content of noncombustible energy resources. AEO2017 uses fossil-equivalence to represent the energy content of renewable fuels.

Domestic energy consumption remains relatively flat in the Reference case—

Energy consumption (Reference case)
quadrillion British thermal units



—but the fuel mix changes significantly

- Overall U.S. energy consumption remains relatively flat in the Reference case, rising 5% from the 2016 level by 2040 and somewhat close to its previous peak. Varying assumptions about economic growth rates or energy prices considered in the AEO2017 side cases affect projected consumption.

- Natural gas use increases more than other fuel sources in terms of quantity of energy consumed, led by demand from the industrial and electric power sectors.

- Petroleum consumption remains relatively flat as increases in energy efficiency offset growth in the transportation and industrial activity measures.

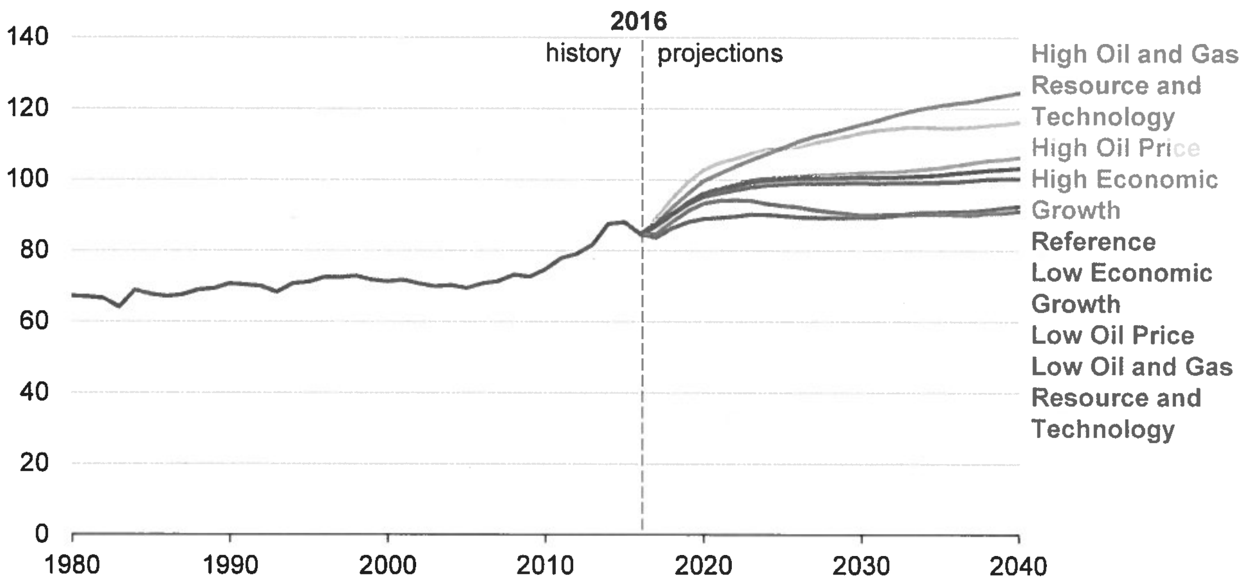
- Coal consumption decreases as coal loses market share to natural gas and renewable generation in the electric power sector.

- On a percentage basis, renewable energy grows the fastest because capital costs fall with increased penetration and because current state and federal policies encourage its use.

- Liquid biofuels growth is constrained by relatively flat transportation energy use and blending limitations.

Energy production ranges from nearly flat in the Low Oil and Gas Resource and Technology case—

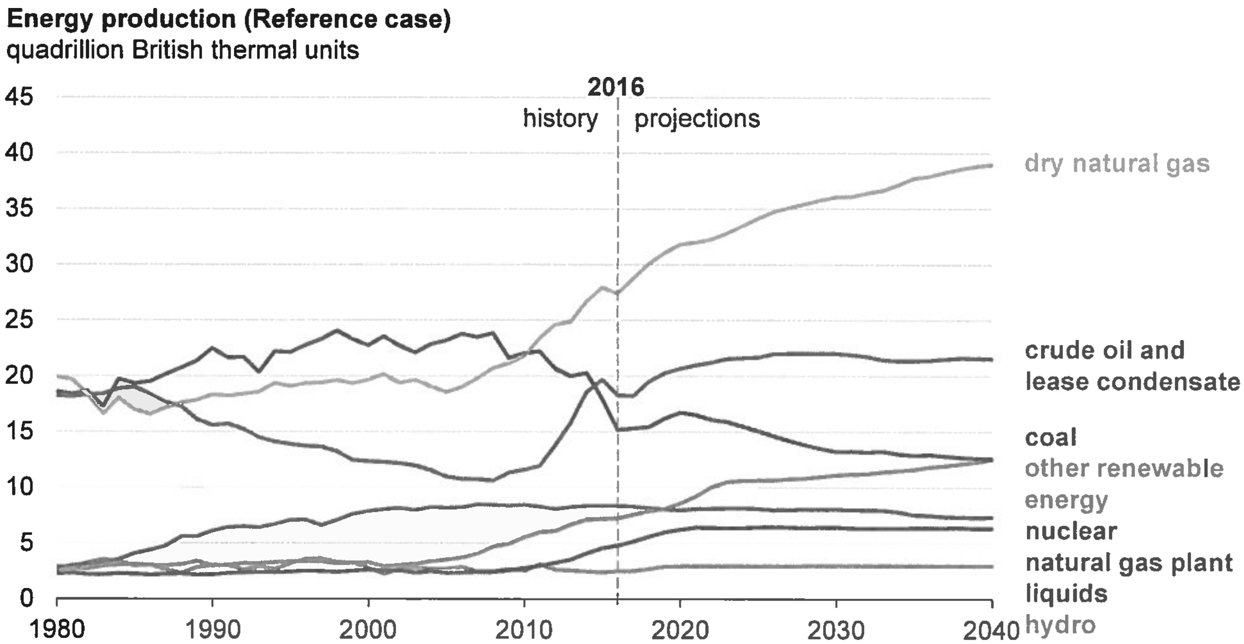
Total energy production
quadrillion British thermal units



—to continued growth in the High Resource and Technology case

- Unlike energy consumption, which varies less across AEO2017 cases, projections of energy production vary widely.
- Total energy production increases by more than 20% from 2016 through 2040 in the Reference case, led by increases in renewables, natural gas, and crude oil production.
- Production growth is dependent on technology, resources, and market conditions.
- The High Oil and Gas Resource and Technology case assumes higher estimates of unproved Alaska resources; offshore Lower 48 resources; and onshore Lower 48 tight oil, tight gas, and shale gas resources than in the Reference case. This case also assumes lower costs of producing these resources. The Low Oil and Gas Resource and Technology case assumes the opposite.
- The High Oil Price case illustrates the impact of higher world demand for petroleum products, lower Organization of the Petroleum Exporting Countries (OPEC) upstream investment, and higher non-OPEC exploration and development costs. The Low Oil Price case assumes the opposite.

U.S. energy production continues to increase in the Reference case—



—led by growth in natural gas and renewables

- Natural gas production accounts for nearly 40% of U.S. energy production by 2040 in the Reference case. Varying assumptions about resources, technology, and prices in alternative cases significantly affect the projection for U.S. production.

- Crude oil production in the Reference case increases from current levels, then levels off around 2025 as tight oil development moves into less productive areas. Like natural gas, projected crude oil production varies considerably with assumptions about resources and technology.

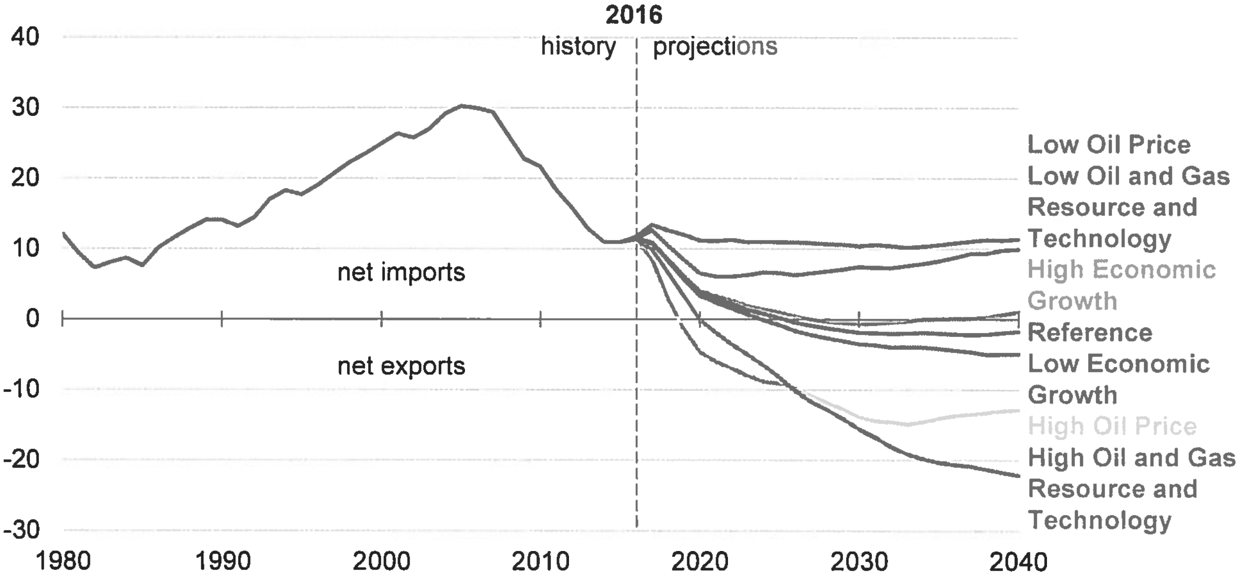
- Coal production trends in the Reference case reflect the domestic regulatory environment, including the implementation of the Clean Power Plan, and export market constraints.

- Nonhydroelectric renewable energy production grows, reflecting cost reductions and existing policies at the federal and state level that promote the use of wind and solar energy.

- Nuclear generation declines modestly over 2017–40 in the Reference case as new builds already being developed and plant uprates nearly offset retirements. The decline in nuclear generation accelerates beyond 2040 as a significant share of existing plants is assumed to be retired at age 60.

The United States becomes a net energy exporter in most cases—

Net energy trade
quadrillion British thermal units

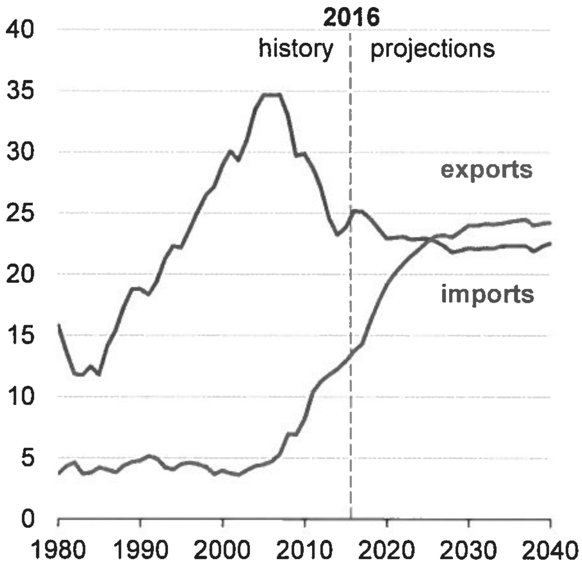


—and under high resource and technology assumptions, net exports are significantly higher than in the Reference case

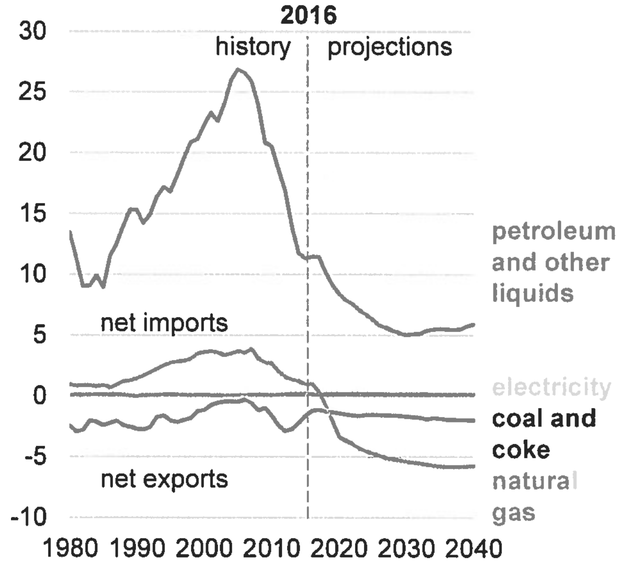
- The United States is projected to become a net energy exporter by 2026 in the Reference case projections, but the transition occurs earlier in three of the AEO2017 side cases.
- Net exports are highest in the High Oil and Gas Resource and Technology case as favorable geology and technological developments combine to produce oil and natural gas at lower prices.
- The High Oil Price case includes favorable economic conditions for producers, but consumption is lower in response to higher prices. Without substantial improvements in technology and more favorable resource availability, U.S. energy production declines in the 2030s.
- In the Low Oil Price and Low Oil and Gas Resource and Technology cases, the United States remains a net importer over the analysis period.
- In the Low Oil and Gas Resource and Technology case, the conditions are unfavorable for U.S. crude oil production at levels that support exports.
- In the Low Oil Price case, prices are too low to provide a strong incentive for high U.S. production.

The United States becomes a net energy exporter in the Reference case—

Energy trade (Reference case)
quadrillion British thermal units



Net energy trade (Reference case)
quadrillion British thermal units



—as natural gas exports increase and net petroleum imports decrease

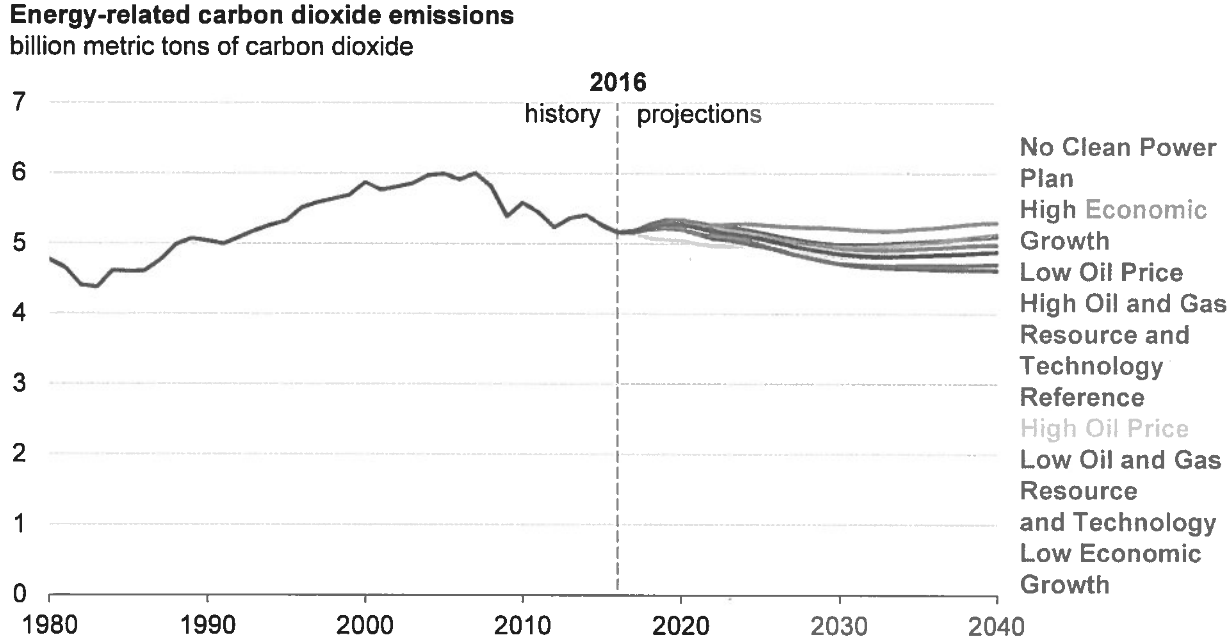
- The United States has been a net energy importer since 1953, but declining energy imports and growing energy exports make the United States a net energy exporter by 2026 in the Reference case projection.

- Crude oil and petroleum products dominate U.S. energy trade. The United States is both an importer and exporter of petroleum liquids, importing mostly crude oil and exporting mostly petroleum products such as gasoline and diesel throughout the Reference case projection.

- Natural gas trade, which has historically been mostly shipments by pipeline from Canada and to Mexico, is projected to be increasingly dominated by liquefied natural gas exports to more distant destinations.

- The United States continues to be a net exporter of coal (including coal coke), but its exports growth is not expected to increase significantly because of competition from other global suppliers closer to major markets.

Energy-related carbon dioxide emissions decline in most AEO cases—

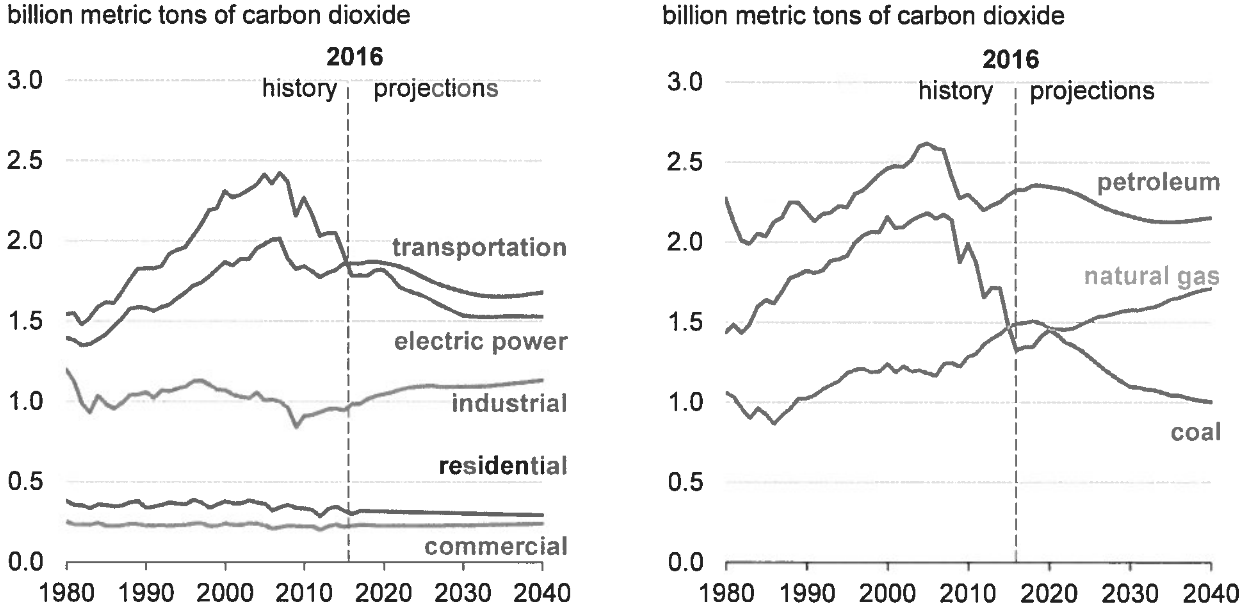


—with the highest emissions projected in the No Clean Power Plan case

- The electric power sector accounted for about 40% of the U.S. total energy-related carbon dioxide (CO2) emissions in 2011, with a declining share in recent years.
- The Clean Power Plan (CPP), which is currently stayed pending judicial review, requires states to develop plans to reduce CO2 emissions from existing generating units that use fossil fuels.
- Combined with lower natural gas prices and the extension of renewable tax credits, the CPP accelerates a shift toward less carbon-intensive electricity generation.
- The Reference case includes the CPP and assumes that states select the mass-based limits on CO2 emissions. An alternative case in AEO2017 assumes that the CPP is not implemented.
- AEO2016 included extensive analysis of the CPP and presented several side cases that examined various compliance options available to states.

Reference case energy-related carbon dioxide emissions fall—

U.S. energy-related carbon dioxide emissions (Reference case)



—but at a slower rate than in the recent past

- From 2005 to 2016, energy-related carbon dioxide (CO2) emissions fell at an average annual rate of 1.4%. From 2016 to 2040, energy-related CO2 emissions fall 0.2% annually in the Reference case.

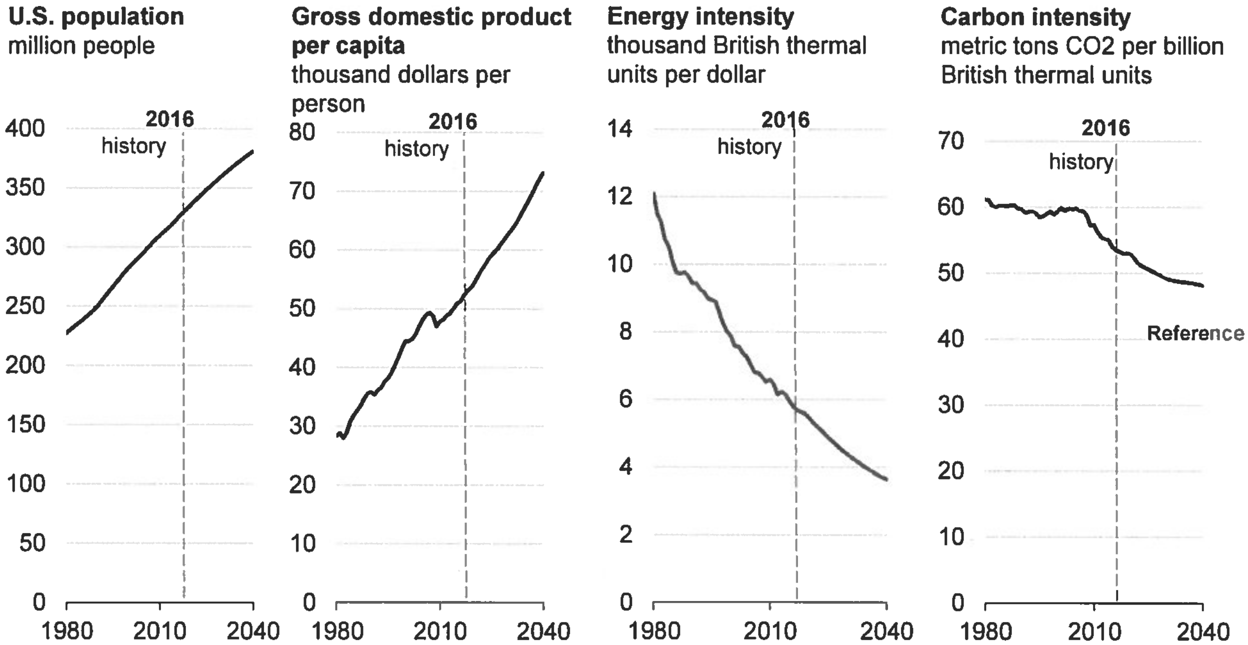
- In the industrial sector, growth in domestic industries, such as bulk chemicals, leads to higher energy consumption and emissions.

- In the electric power sector, coal-fired plants are replaced primarily with new natural gas, solar, and wind capacity, which reduces electricity-related CO2 emissions.

- Direct emissions in the residential and commercial building sectors are largely from space heating, water heating, and cooking equipment. The CO2 emissions associated with the use of electricity in these sectors exceed the direct emissions from these sectors.

- Energy-related CO2 emissions from the transportation sector surpassed those from the electric power sector in 2016. Transportation CO2 emissions remain relatively flat after 2030 as consumption and the carbon intensity of transportation fuels stay relatively constant.

Although population and economic output per capita are assumed to continue rising—



—energy intensity and carbon intensity are projected to continue falling in the Reference case

- In the United States, the amount of energy used per unit of economic growth (energy intensity) has declined steadily for many years, while the amount of CO_2 emissions associated with energy consumption (carbon intensity) has generally declined since 2008.

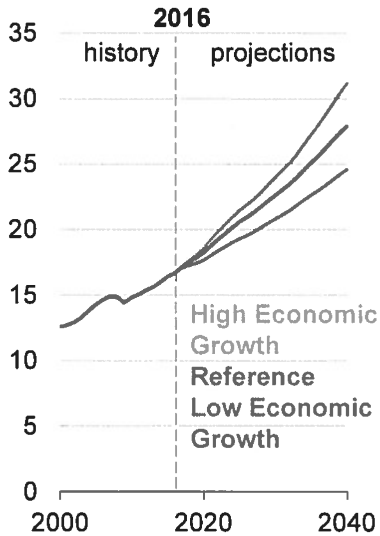
- These trends are projected to continue as energy efficiency, fuel economy improvements, and structural changes in the economy all lower energy intensity.

- Carbon intensity declines largely as a result of changes in the U.S. energy mix that reduce the consumption of carbon-intensive fuels and increase the use of low- or no-carbon fuels.

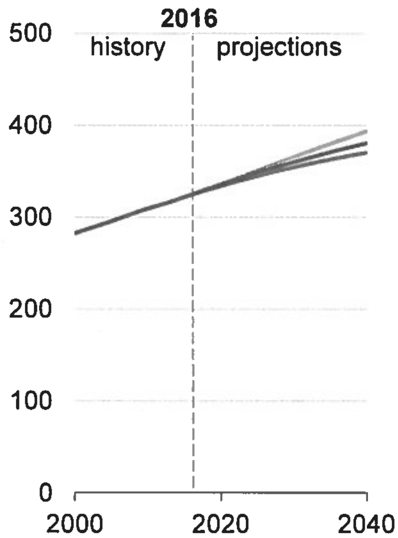
- By 2040, energy intensity and carbon intensity are 37% and 10% lower than their respective 2016 values in the Reference case, which assumes only the laws and regulations currently in place.

Different macroeconomic assumptions address the energy implications of the uncertainty—

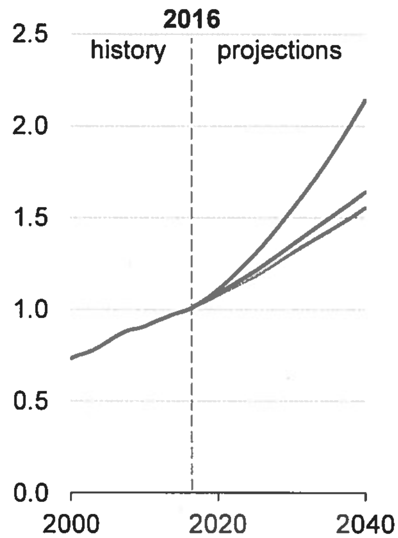
Gross domestic product
trillion 2009 dollars



Population
millions



Price index (2016 = 1.0)
GDP chain-type price index



—surrounding future economic trends

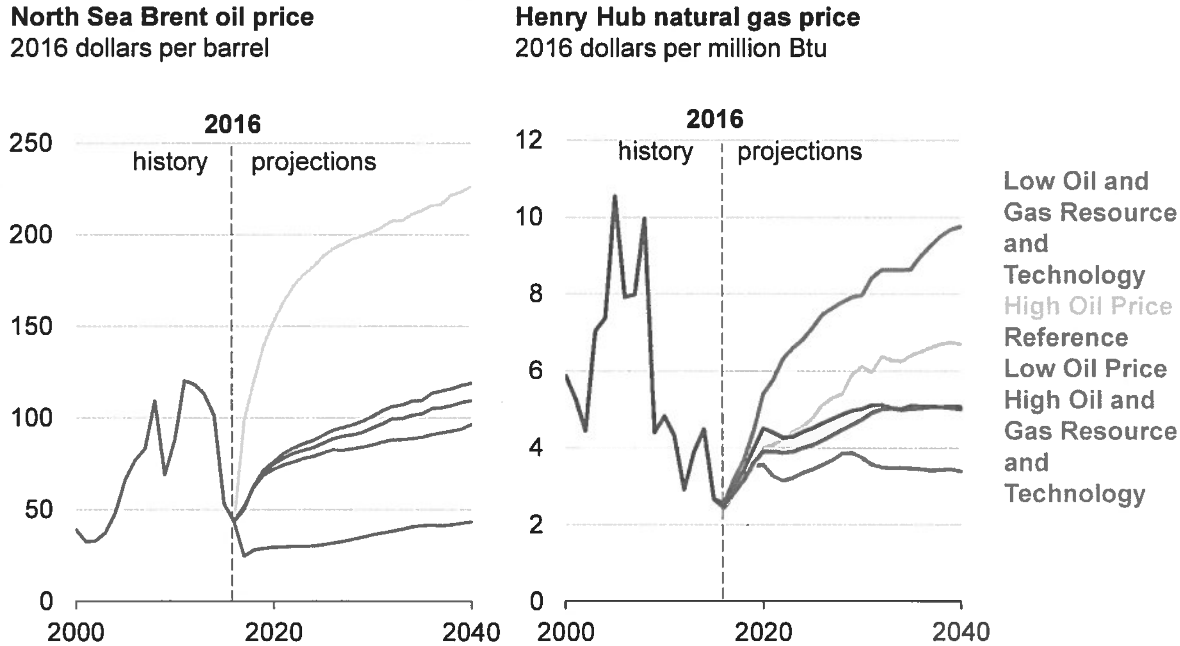
- The Reference, High Economic Growth, and Low Economic Growth cases illustrate three possible paths for U.S. economic growth. The High Economic Growth case assumes higher annual growth and lower annual inflation rates (2.6% and 1.9%, respectively) than in the Reference case (2.2% and 2.1%, respectively), while the Low Economic Growth case assumes lower growth and higher inflation rates (1.6% and 3.2%, respectively).

- In general, higher economic growth (as measured by gross domestic product) leads to greater investment, increased consumption of goods and services, more trade, and greater energy consumption.

- Differences among the cases reflect different expectations for growth in population, labor force, capital stock, and productivity. These changes affect growth rates in household formation, industrial activity, and amounts of travel, as well as investment decisions for energy production.

- All three cases assume smooth economic growth and do not anticipate business cycles or large economic shocks.

Reference case oil prices rise from current levels while natural gas prices remain relatively low—



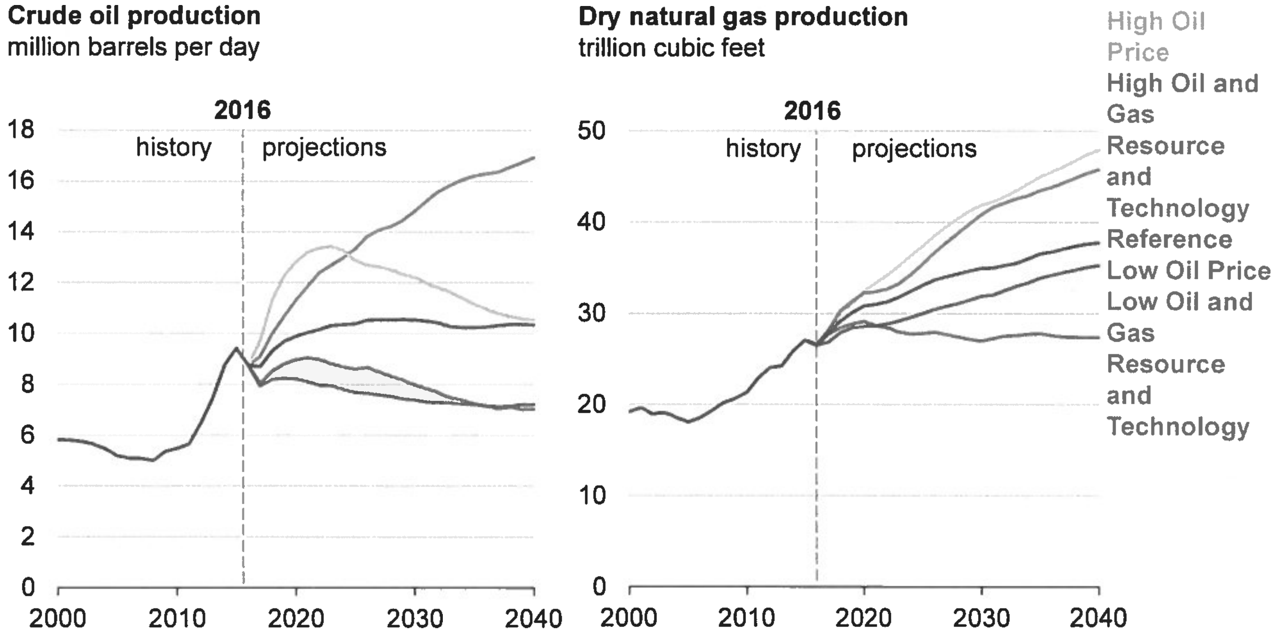
—price paths in the side cases are very different from those in the Reference case

- In real terms, crude oil prices in 2016 (based on the global benchmark North Sea Brent) were at their lowest levels since 2004, and natural gas prices (based on the domestic benchmark Henry Hub) were the lowest since prior to 1990. Both prices are projected to increase over the projection period.

- Crude oil prices in the Reference case are projected to rise at a faster rate in the near term than in the long term. However, price paths vary significantly across the AEO2017 side cases that differ in assumptions about U.S. resources and technology and global market conditions.

- Natural gas prices in the Reference case also rise and then remain relatively flat at about $5 per million British thermal units (MMBtu) over 2030–40, then rise again over the following decade (not shown on the graph). Projected U.S. natural gas prices are highly sensitive to assumptions about domestic resource and technology explored in the side cases.

United States crude oil and natural gas production depends on oil prices—



—as well as resource availability and technological improvements

- Projections of tight oil and shale gas production are uncertain because large portions of the known formations have relatively little or no production history, and extraction technologies and practices continue to evolve rapidly. Continued high rates of drilling technology improvement could increase well productivity and reduce drilling, completion, and production costs.

- In the High Oil and Gas Resource and Technology case, both crude oil and natural gas production continue to grow.

- Crude oil prices affect natural gas production primarily through changes in global natural gas consumption/exports, as well as increases in natural gas production from oil formations (associated gas).

- In the High Oil Price case, the difference between the crude oil and natural gas prices creates more incentive to consume natural gas in energy-intensive industries and for transportation, and to export it overseas as liquefied natural gas, all of which drive U.S. production upward. Without the more favorable resources and technological developments found in the High Oil and Gas Resource and Technology case, U.S. crude oil production begins to decline in the High Oil Price case, and by 2040, production is nearly the same as in the Reference case.

Critical drivers and uncertainty

Various factors influence the model results in AEO2017, including: new and existing laws and regulations, updated data, changing market conditions, and model improvements since AEO2016.

New laws and regulations reflected in the Reference Case

- California state law SB-32, which was passed in 2016, requires statewide greenhouse gas emissions to be 40% below the 1990 level by 2030. This law has cross-cutting effects in California, particularly on electricity and transportation emissions, and also has national implications because of the size of California's energy market.

- The second phase of Federal Greenhouse Gas and Fuel Efficiency standards for medium- and heavy-duty vehicles was issued in 2016. These standards, which ramp up through model year 2027, reduce energy consumption in the transportation sector in the midterm.

Significant data updates

- Data from the 2012 Commercial Buildings Energy Consumption Survey (CBECS) were released in 2016, leading to revised estimates of commercial building mix and energy consumption.
- Updated data on lower battery costs increased EIA's outlook for sales of battery electric vehicles and plug-in hybrid electric vehicles.

Model improvements

- This AEO is the first projection to include model results through 2050, which are available on the AEO page of the EIA website. The graphics in this presentation focus on projections through 2040.
- AEO2017 better captures the dynamics of well productivity that occur when tight oil development moves into less productive areas and as tighter well spacing in established areas diminishes the productivity of each well.
- In contrast to prior AEOs, the AEO2017 Reference case does not assume all nuclear plants that operate through the end of a 60-year period (a 40-year initial operating license plus a 20-year license renewal period) will apply for and receive a subsequent license renewal (SLR) and operate for an additional 20 years. Instead, 25% of reactors reaching age 60 are assumed to retire.

Changing market conditions

- Continuing the trend in previous AEOs, demand for crude oil imports weakens as Lower 48 onshore tight oil development continues to be the main driver of total U.S. crude oil production, accounting for about 60% of cumulative domestic production between 2016 and 2040 in the Reference case.

- Policy-driven economic incentives accelerate renewable generation. With a continued (but reduced) tax credit, solar capacity growth continues throughout the projection period, while tax credits provided for plants entering service until, but no later than 2024, provide incentives for new wind capacity in the near term.

- With solar energy's declining capital costs and solar electricity output that is highest during times of high (on-peak) demand, solar capacity is anticipated to grow throughout the projection period.

EIA will continue to update and refine the market dynamics and technologies in future AEOs, especially with the projection extended to 2050. Ongoing work aims to:

Electric Power

- Energy storage: Improve the representation of energy storage to accommodate multiple grid services including spinning reserve and renewables integration.

- Renewable generation: Include improved representation of intermittent generation resources such as wind and solar. Examine the potential for transmission enhancements to mitigate regional effects of high levels of wind and solar generation. Develop higher resolution time-of-day and seasonal value and operational impact of wind.

- Utility rate structure: Estimate the impact of high levels of distributed photovoltaic generation on utility rate structure.

- Generator retirement: Assess the vintage of the electric generation fleet and potential for future retirements and life extension for all technologies, including existing nuclear, coal, natural gas, and renewable fleets.

EIA will continue to update and refine the market dynamics and technologies in future AEOs, especially with the projection extended to 2050. Ongoing work aims to:

Liquid Fuels

- Natural gas plant liquids: Re-examine and improve natural gas plant liquids production to allow for changing proportions in produced natural gas over time.

- Technology: Update biofuels and emerging technological assumptions for gas-to-liquids, coal-to-liquids, and carbon sequestration. Improve feedstock curves for all biofuel technologies.

Natural Gas

- Transmission: Improve representation of natural gas market flows with a redesigned NEMS module, allowing for increased flexibility to respond to changing market dynamics (i.e., changing regional flows/bi-directional flow). Improve regional and temporal granularity.

EIA will continue to update and refine the market dynamics and technologies in future AEOs, especially with the projection extended to 2050. Ongoing work aims to:

Transportation

- Technology: Add autonomous vehicle technologies in the transportation sector and consider their implications for on-road fuel economy and total travel demand. Develop the capability to evaluate scenarios where commercial delivery vehicles can operate without human operators and do not require occupant protection features.

- Behavior: Examine the impact of ridesharing programs on travel behavior, including the amount of travel and vehicle choice decisions.

- Fleet mix: Examine determinants of the evolution of the light-duty vehicle fleet mix, which can affect fuel use given the different fuel economy standards for passenger cars and light trucks.

EIA will continue to update and refine the market dynamics and technologies in future AEOs, especially with the projection extended to 2050. Ongoing work aims to:

Buildings

- Distributed generation: Conduct further research and enhance building representation of distributed generation such as photovoltaic, including battery technologies.

- Technology: Review the spread of light emitting diodes and other efficient technologies in buildings. Investigate the adoption of sensor technologies for lights and heating/air conditioning in buildings.

Industrial

- Technology: Incorporate technological change into the industrial model. Apply ongoing technology assessment research in metal-based durables and bulk chemicals to revise energy-intensity projections in those industries.

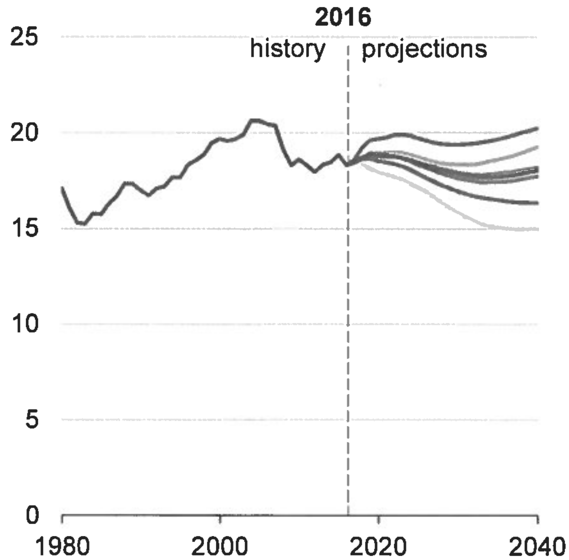
- Environment: Research the feasibility of carbon capture and storage and implement for carbon-intensive industries such as bulk chemicals, steel, and cement.

Petroleum and other liquids

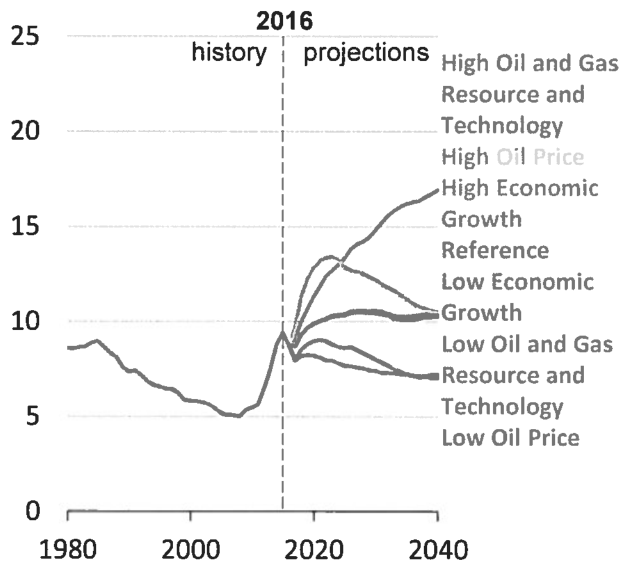
U.S. crude oil production rebounds from recent lows, driven by continued development of tight oil resources. With consumption flat to down compared to recent history, net crude oil and petroleum product imports as a percentage of U.S. product supplied decline across most cases.

U.S. petroleum product consumption remains below 2005 levels through 2040 in most AEO2017 cases—

Petroleum product consumption
million barrels per day



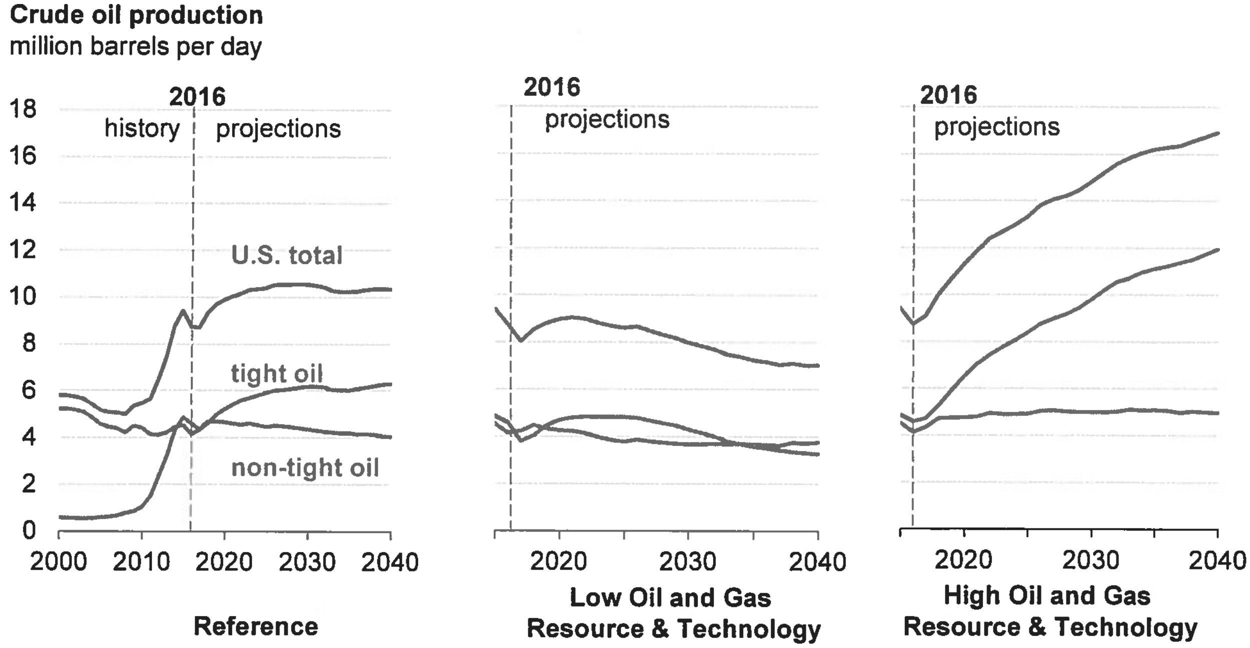
Crude oil production
million barrels per day



—while crude oil production rebounds from recent declines

- In all cases, U.S. petroleum consumption is projected to remain below the 2005 level, the highest recorded to date, through 2040.
- Low oil prices result in increased domestic consumption in the Low Oil Price case. Simultaneously, low prices drive down domestic production, resulting in generally higher import levels.
- The domestic wellhead price does not change significantly in the economic growth cases, resulting in consumption that is similar to the Reference case level.
- Reference case U.S. crude oil production is projected to recover from recent declines, as upstream producers increase output because of the combined effects of the rise in prices from recent lows and cost reductions.
- In the Reference case, higher refinery inputs in the near term absorb higher forecast levels of U.S. crude oil production, limiting changes to imports. Eventually, net crude oil imports increase because domestic crude production does not keep pace with refinery inputs as domestic refiners expand product exports.

Tight oil dominates U.S. production in the Reference case—



—but other types of oil production continue to yield significant volumes

- Despite rising prices, Reference case U.S. crude oil production levels off between 10 and 11 million barrels per day as tight oil development moves into less productive areas and as well productivity gradually decreases.

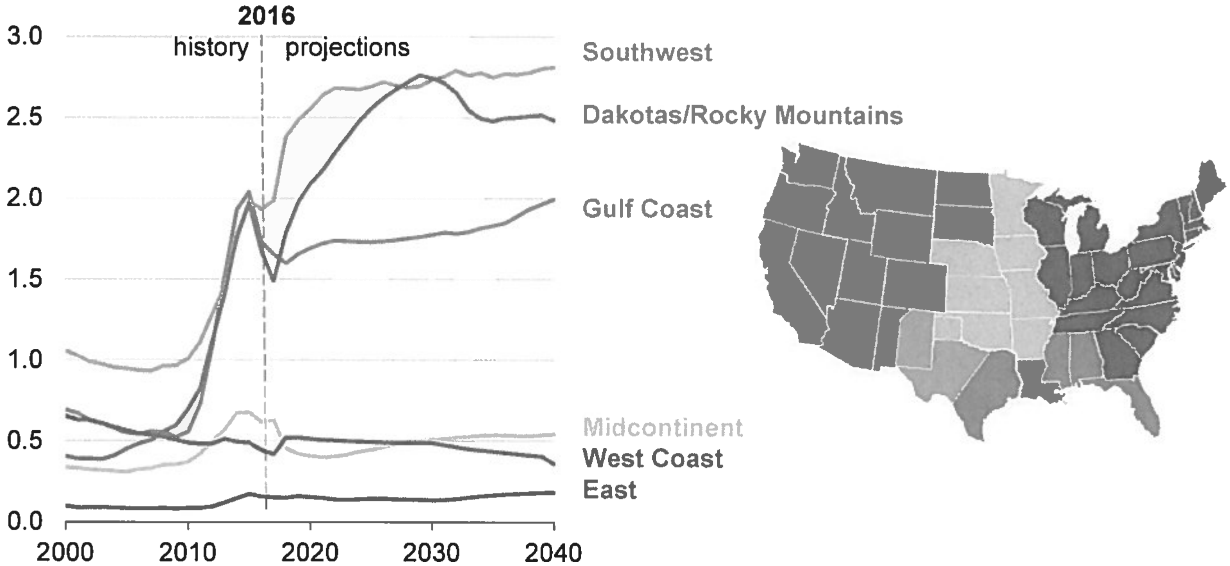
- Lower 48 onshore tight oil development continues to be the main driver of total U.S. crude oil production, accounting for about 60% of the total cumulative domestic production in the Reference case domestic between 2016 and 2040.

- Announced discoveries in deepwater Gulf of Mexico lead to production increases in the Lower 48 states offshore through 2020. Reference case offshore production then declines until 2034, with the rate of decline slowing through 2040 as production from new discoveries offset declines in legacy fields.

- In the High Oil and Gas Resource and Technology case, higher well productivity reduces development and production costs per unit, resulting in more resource development than in the Reference case. These assumptions are based on higher initial estimated ultimate recovery per well, larger volumes of onshore Lower 48 tight oil and shale gas resources, and higher rates of long-term technology improvement.

The Southwest and Dakotas/Rocky Mountains regions lead growth in tight oil production in the Reference case—

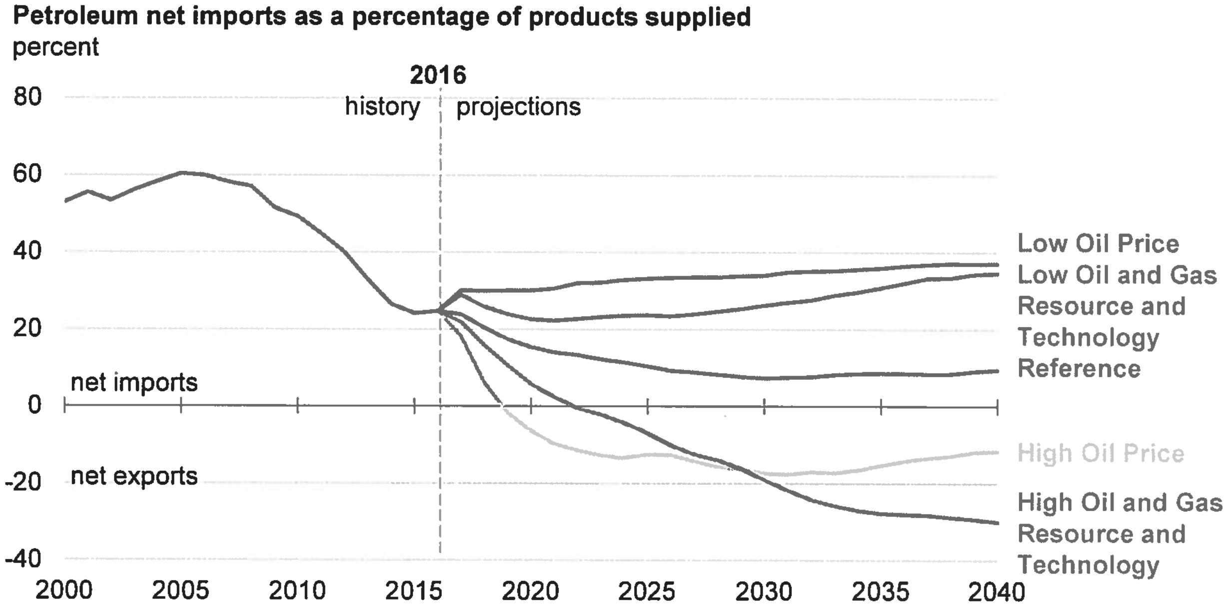
Lower 48 onshore crude oil production by region (Reference case)
million barrels per day



—and the Gulf Coast region remains an important contributor to overall production levels

- Growth in Lower 48 onshore crude oil production is projected to occur mainly in the Southwest, Dakotas/Rocky Mountains, and Gulf Coast regions.
- Growth in crude oil production in the Southwest is supported by increases in the Permian basin, which includes both tight and non-tight formations.
- Growth in the Dakotas/Rocky Mountains crude oil production is driven by increased production from the Bakken play, which is exclusively tight oil.
- Production in the Gulf Coast region, primarily from the Eagle Ford and Austin Chalk plays, increases throughout most of the projection period.

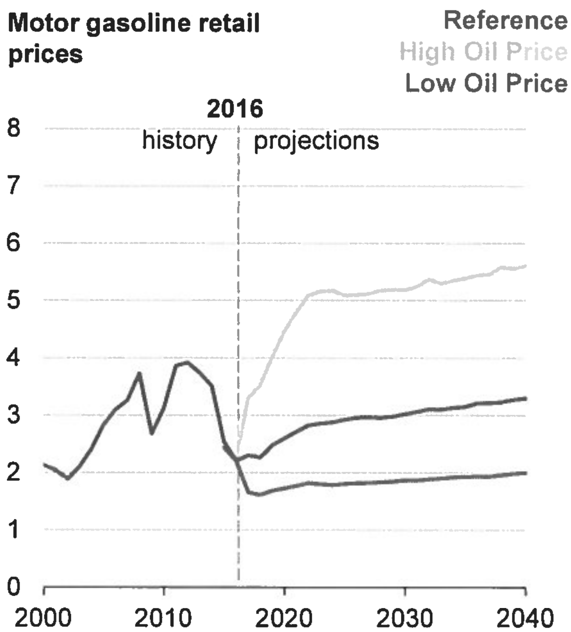
In most cases, the United States remains a net petroleum importer—

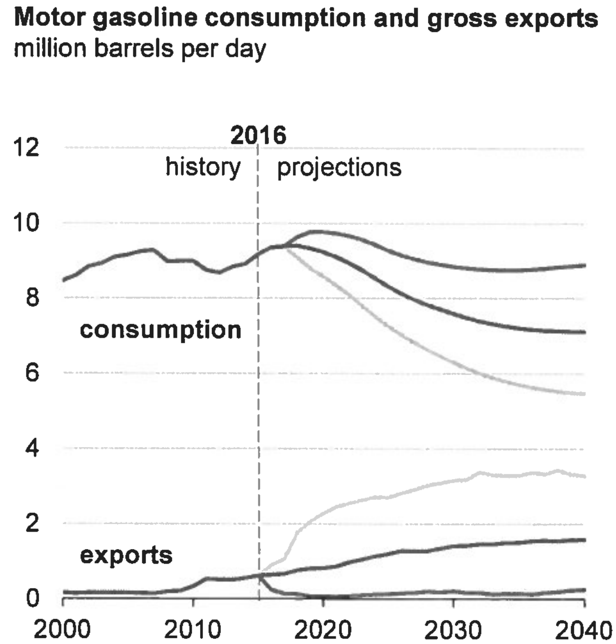


—but in the High Oil Price and the High Oil and Gas Resource and Technology cases, the United States becomes a net exporter

- In the Reference case, net crude oil and petroleum product imports as a percentage of U.S. product supplied fall through 2030.
- The Low Oil Price case results in lower U.S. crude oil production because of the lack of economic incentive for producers to drill in higher-cost tight oil formations and offshore crude oil reserves. Relatively lower prices in this case result in higher domestic product demand that promotes higher crude oil and petroleum product imports.
- In the High Oil Price case, high crude oil prices lead to increased U.S. crude oil production from higher-cost production areas and result in lower domestic petroleum product demand, which leads to lower product imports.
- In the High Oil and Gas Resource and Technology case, U.S. crude oil and petroleum liquids exports are higher compared with the Reference case.

U.S. motor gasoline consumption and exports are sensitive to changes in prices—





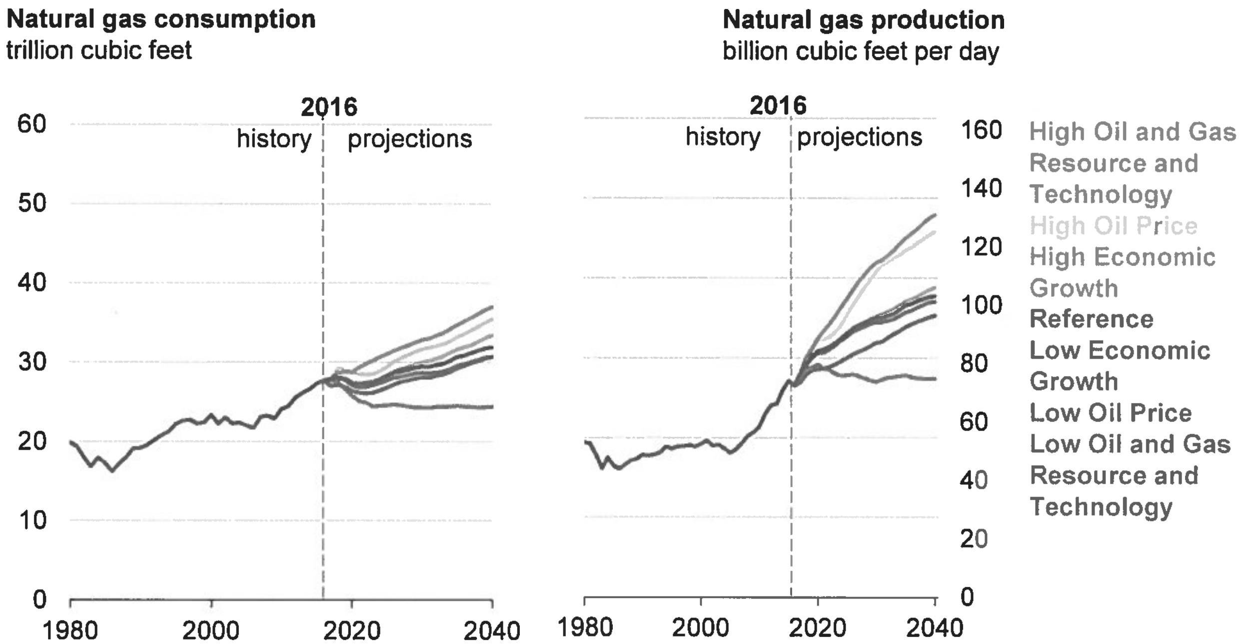
—although efficiency improvements result in declining consumption across all cases

- U.S. average retail prices for motor gasoline are driven largely by changes in crude oil prices because crude oil is the main input used to produce motor gasoline.
- Improvements in vehicle fuel efficiency contribute to falling U.S. motor gasoline consumption, while high levels of refinery output result in continued growth of motor gasoline exports through 2040.
- In the Low Oil Price case, greater domestic motor gasoline consumption and lower domestic crude oil production results in lower exports of motor gasoline.
- The High Oil Price case results in lower domestic motor gasoline consumption and greater exports, reflecting the domestic gasoline demand response to higher prices as well as the U.S. refining industry's competitive advantage.

Natural gas

Across most cases, natural gas production increases despite relatively low and stable natural gas prices, supporting higher levels of domestic consumption and natural gas exports. Projections are sensitive to resource and technology assumptions.

U.S. natural gas consumption increases across most cases through most of the projection period—



—and in combination with growing net exports, supports production growth

- In the Reference case, natural gas production over the 2016–20 period is projected to grow at about the same rapid rate (nearly 4% annual average) as it has since 2005. Since 2005, technologies to more efficiently produce natural gas from shale and tight formations have driven prices down, spurring growth in consumption and net exports.

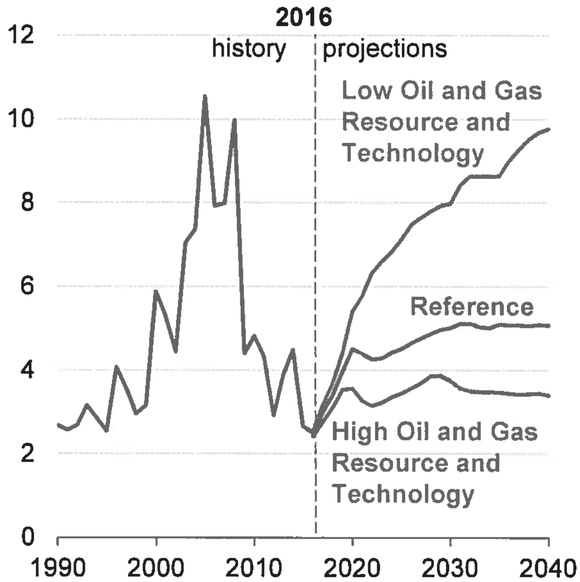
- Beyond 2020, natural gas production in the Reference case is projected to grow at a lower rate (1.0% annual average) as net export growth moderates, domestic natural gas use becomes more efficient, and prices slowly rise. Rising prices are moderated by assumed advances in oil and natural gas extraction technologies.

- Near-term production growth is supported by large, capital-intensive projects, such as new liquefaction export terminals and petrochemical plants, built in response to low natural gas prices.

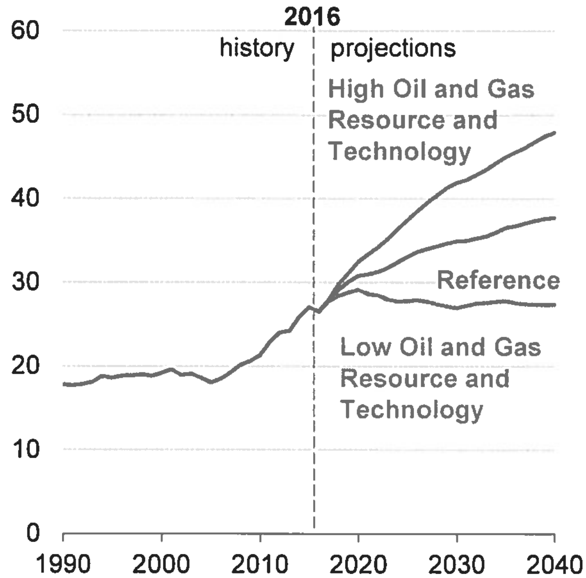
- Despite decreasing in the near term, in all cases, other than the Low Oil and Gas Resource and Technology case, U.S. natural gas consumption is expected to increase during much of the projection period.

Natural gas prices are projected to increase—

Natural gas spot price at Henry Hub
2016 dollars per million British thermal units



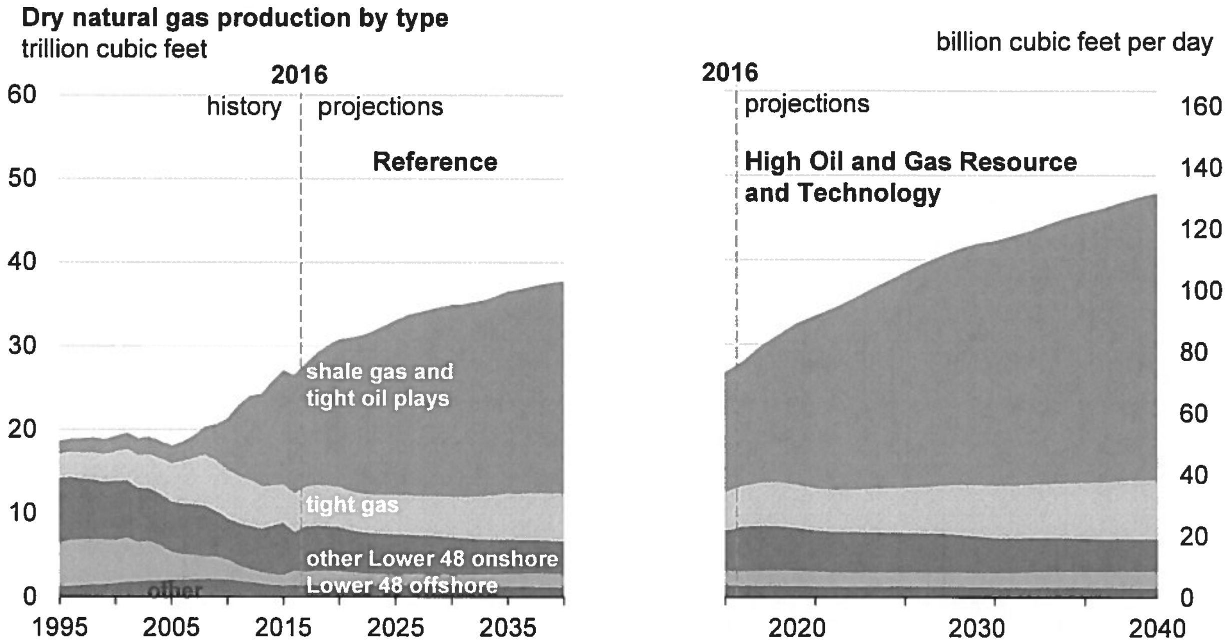
Dry natural gas production
trillion cubic feet



—and are sensitive to the availability of new technology and resources

- The range of projected Henry Hub natural gas prices depends on the assumptions about the availability of oil and natural gas resources and drilling technology.
- In the Reference case, the natural gas spot prices at the U.S. benchmark Henry Hub in Louisiana rise because of increased drilling levels, production expansion into less prolific and more expensive-to-produce areas, and demand from both petrochemical and liquefied natural gas export facilities.
- Reference case prices rise modestly from 2020 through 2030 as electric power consumption increases; however, natural gas prices stay relatively flat after 2030 as technology improvements keep pace with rising demand.
- In the High Oil and Gas Resource and Technology case, lower costs and higher resource availability allow for increased levels of production at lower prices, increasing domestic consumption and exports.
- In the Low Oil and Gas Resource and Technology case, prices near historical highs drive down domestic consumption and exports.

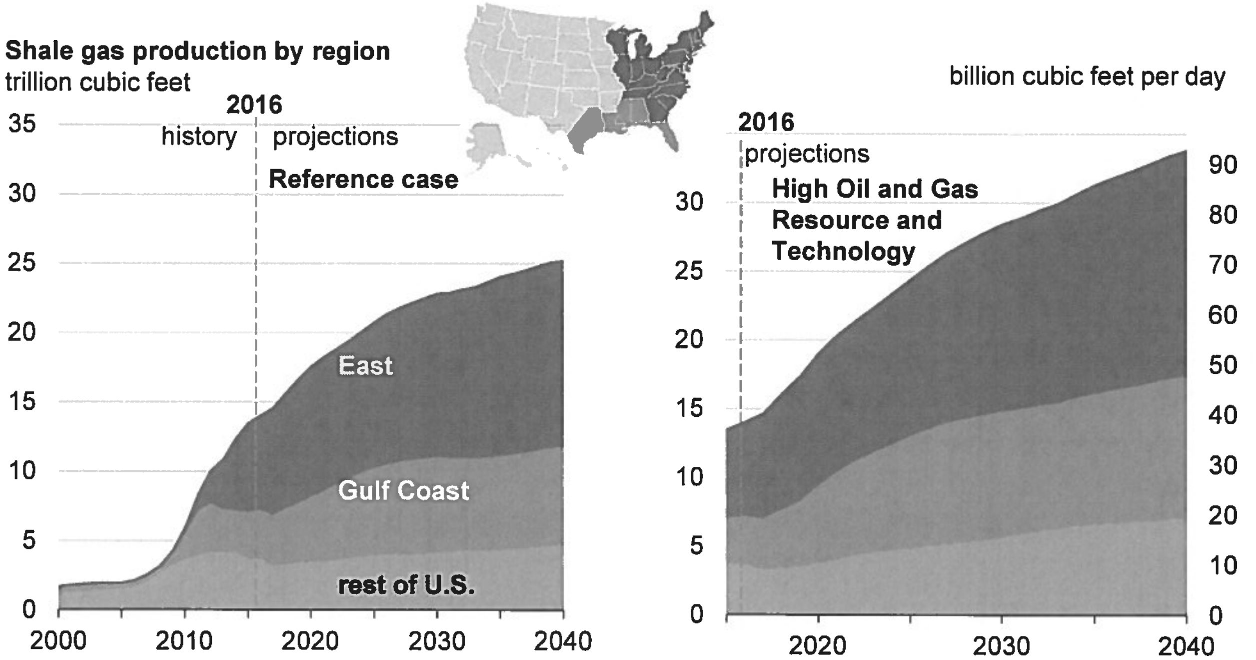
U.S. natural gas production growth is the result of continued development of shale gas and tight oil plays—



—which account for nearly two-thirds of natural gas production by 2040

- Production from shale gas and associated gas from tight oil plays is the largest contributor to natural gas production growth, accounting for nearly two-thirds of total U.S. production by 2040 in the Reference case.
- Tight gas production is the second-largest source of domestic natural gas supply in the Reference case, but its share falls through the late-2020s as the result of growing development of shale gas and tight oil plays.
- As new discoveries offset declines in legacy fields, offshore natural gas production in the United States increases over the projection period.
- Production of coalbed methane generally continues to decline through 2040 because of unfavorable economic conditions for producing that resource.

Plays in the East lead production of U.S. natural gas from shale resources in the Reference case—



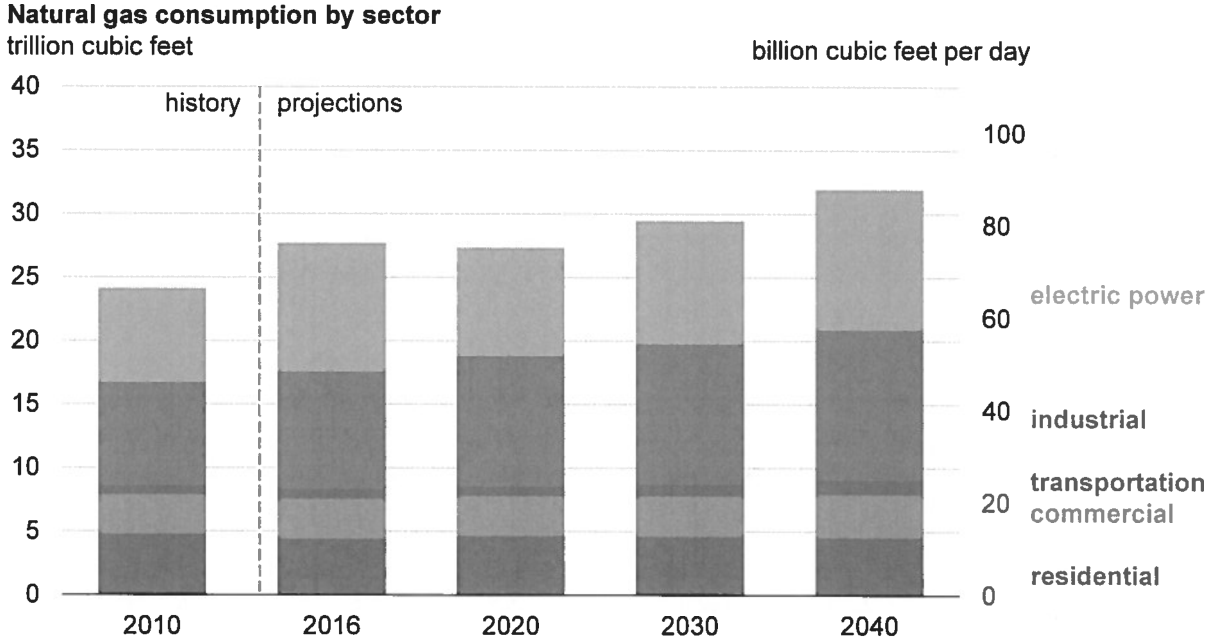
—but Gulf Coast onshore production also grows

- Continued development of the Marcellus and Utica plays in the East is the main driver of growth in total U.S. shale gas production and the main source of total U.S. dry natural gas production.

- Production from the Eagle Ford and Haynesville plays along the Gulf Coast is a secondary contributor to domestic dry natural gas production, with production largely leveling off in the 2030s.

- Continued technological advancement and improvement in industry practices is expected to lower costs and to increase the expected ultimate recovery per well. These changes have a significant cumulative effect in plays that extend over wide areas and have large undeveloped resources (Marcellus, Utica, and Haynesville).

Increasing demand from industrial and electric power markets drive rising domestic consumption of natural gas in the Reference case—



—with comparatively little growth in the residential and commercial sectors

- The industrial sector is the largest consumer of natural gas during most years in the Reference case projections. Major natural gas consumers include the petrochemical industry (where natural gas is used as a feedstock in the production of methanol, ammonia, and fertilizer), other energy-intensive industries that use natural gas for heat and power, and liquefied natural gas producers.

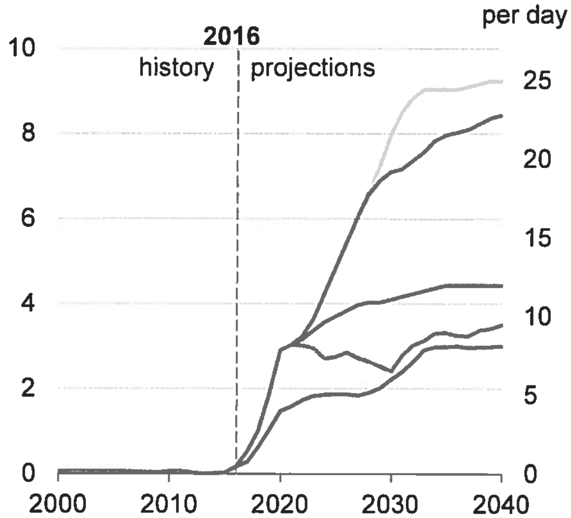
- After a brief near-term decline attributable to strong growth in renewables generation and price competition with coal, natural gas used for electric power generation generally increases after 2020. In particular, the Clean Power Plan (CPP) and the scheduled expiration of renewable tax credits in the mid-2020s result in an increase in the electric power sector's natural gas use. Natural gas consumption in the electric power sector is about 6% higher in the Reference case in 2040 than the No CPP case.

- Natural gas consumption in the residential and commercial sectors remains largely flat as a result of efficiency gains that balance increases in the number of housing units and commercial floor space.

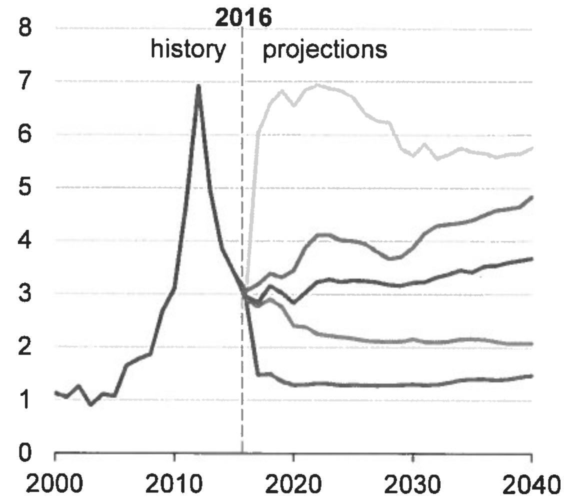
- Although natural gas use rises in the transportation sector, it remains a small share of both total natural gas consumption and transportation fuel demand.

U.S. LNG export levels vary across cases and reflect both the level of global demand—

Liquefied natural gas exports
trillion cubic feet / billion cubic feet per day



Oil-to-natural gas price ratio
energy-equivalent terms



Reference **High and Low Oil and Gas Resource and Technology** **High and Low Oil Price**

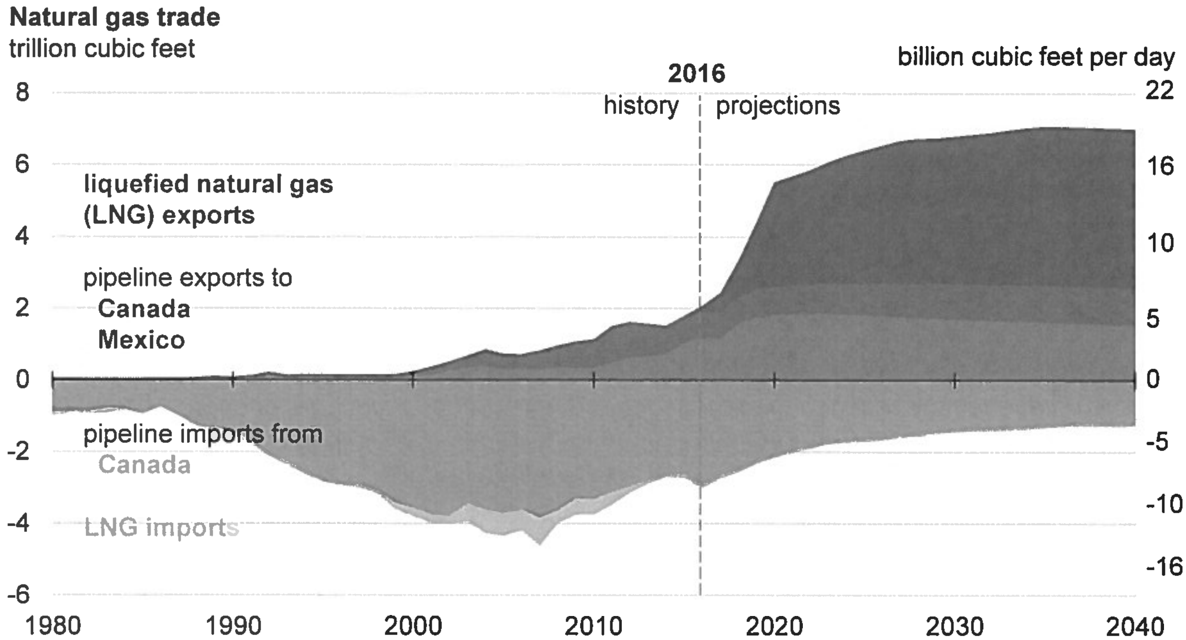
—and the difference between domestic and global natural gas prices, with the latter more heavily influenced by oil prices

- Currently, most liquefied natural gas (LNG) is traded under oil price-linked contracts, in part because oil can substitute for natural gas in industry and for power generation. However, as the LNG market expands, contracts are expected to change, weakening their ties to oil prices.

- When the oil-to-natural gas price ratio is highest, as in the High Oil Price case, U.S. LNG exports are at their highest levels. Demand for LNG generally increases as consumers move away from petroleum products, and LNG produced in the United States has the advantage of domestic spot prices that are less sensitive to global oil prices than supplies from other sources. In the Low Oil Price case, LNG exports from the United States are at their lowest levels throughout the projection period.

- In the High Oil and Gas Resource and Technology case, low U.S. natural gas prices make U.S. LNG exports competitive relative to other suppliers. Conversely, higher U.S. natural gas prices in the Low Oil and Gas Resource and Technology case result in lower U.S. LNG exports.

Increased natural gas trade is dominated by liquefied natural gas exports in the Reference case—



—while pipeline imports into the United States continue to decline

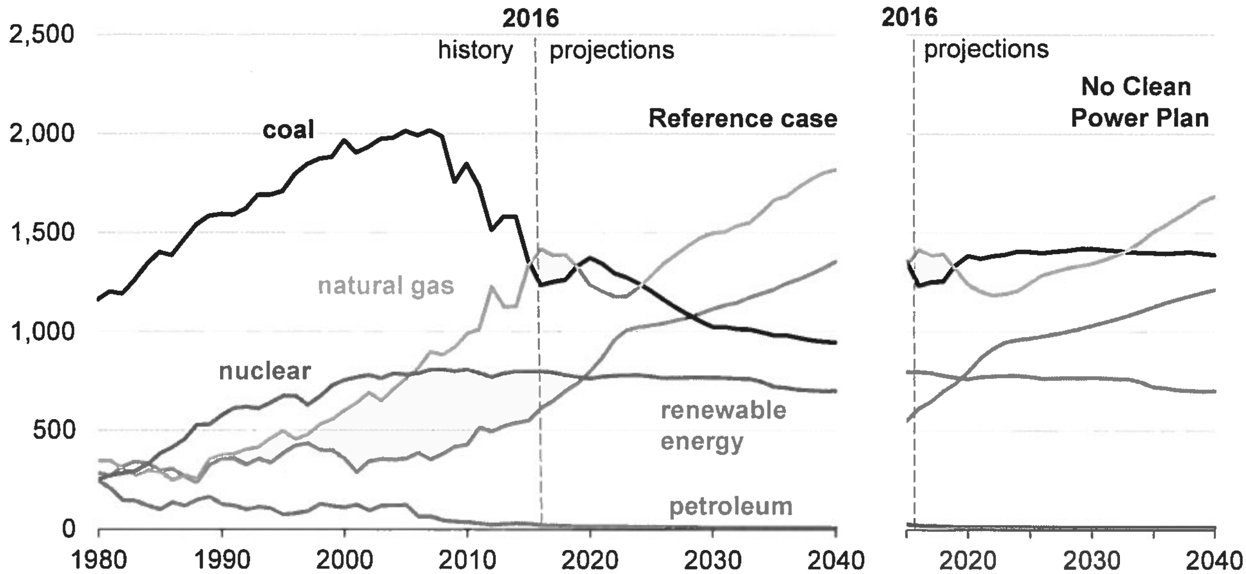
- In the Reference case, liquefied natural gas (LNG) is projected to dominate U.S. natural gas exports by the early-2020s. The first LNG export facility in the Lower 48, Sabine Pass, began operations in 2016, and four more LNG export facilities are scheduled to be completed by 2020.
- After 2020, U.S. exports of LNG grow at a more modest rate as U.S.-sourced LNG becomes less competitive in global energy markets.
- U.S. natural gas exports to Mexico continue to rise in the short term as pipeline infrastructure currently under development allows for rising exports to meet Mexico's increased demand for natural gas to fuel electric power generation.
- U.S. imports of natural gas from Canada, primarily from the West where most of Canada's natural gas is produced, continue to decline, while U.S. exports to Canada—primarily to the East—continue to increase because of Eastern Canada's proximity to abundant natural gas resources in the Marcellus basin.

Electricity

As demand grows modestly, the primary driver for new capacity in the Reference case is the retirement of older, less efficient fossil fuel units—largely spurred by the Clean Power Plan (CPP)—and the near-term availability of renewable energy tax credits. Even if the CPP is not implemented, low natural gas prices and the tax credits result in natural gas and renewables as the primary sources of new generation capacity. The future generation mix is sensitive to the price of natural gas and the growth in electricity demand.

Fuel prices and current laws and regulations drive growing shares of renewables and natural gas in the electricity generation mix—

U.S. net electricity generation from select fuels
billion kilowatthours



—as coal's share declines over time in the Reference case

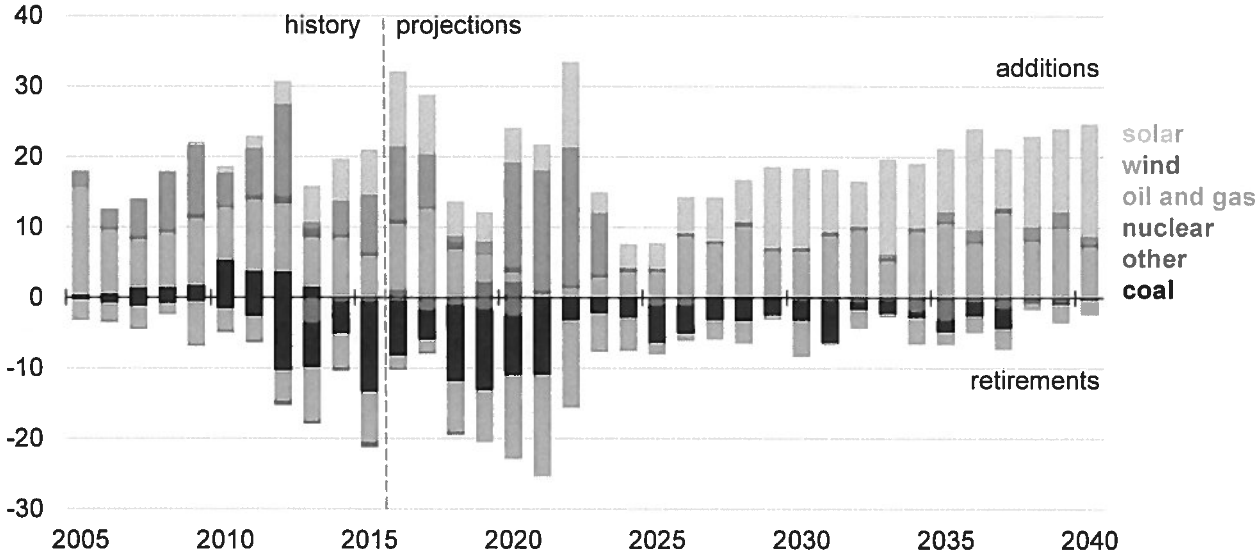
- Fuel prices drive near-term natural gas and coal shares. As natural gas prices rebound from their 20-year lows which occurred in 2016, coal regains a larger generation share over natural gas through 2020.

- Federal tax credits drive near-term growth in renewable generation, displacing growth in natural gas.

- In the longer term, policy (Clean Power Plan, renewables tax credits, and California's SB32) and unfavorable economic conditions compared with natural gas and renewables result in declining coal generation and growing natural gas and renewables generation in the Reference case.

Lower capital costs and the availability of tax credits boost near-term wind additions and sustain solar additions—

Annual electricity generating capacity additions and retirements (Reference case)
gigawatts

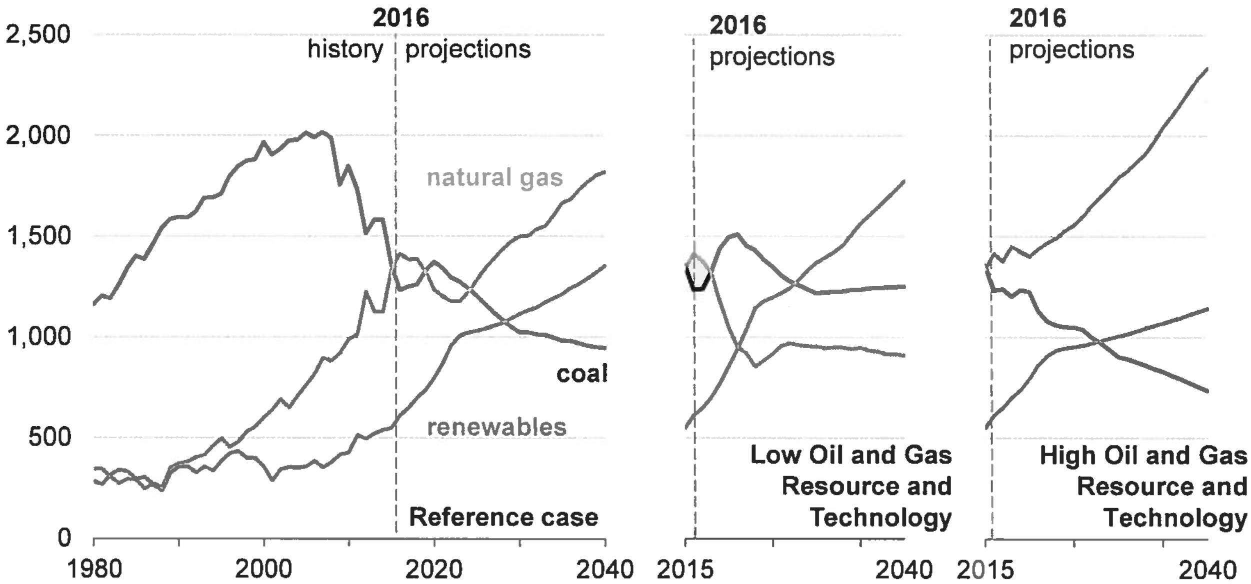


—whereas coal-fired unit retirements in the Reference case are driven by low natural gas prices and the Clean Power Plan

- In the Reference case, nearly 70 gigawatts (GW) of new wind and solar photovoltaic (PV) capacity is added over 2017–21, encouraged by declining capital costs and the availability of tax credits.
- Most of the wind capacity used to comply with the Clean Power Plan (CPP) is built prior to the scheduled expiration of the production tax credit for wind plants coming online by the end of 2023, although wind is still likely to be competitive without the tax credits.
- Continued retirements of older, less efficient fossil fuel units under the CPP support a consistent market for new generating capacity throughout the projection period.
- After 2030, new generation capacity additions are split primarily between solar and natural gas, with solar capacity representing more than 50% of new capacity additions in the Reference case between 2030 and 2040.

Natural gas resource availability affects prices that plays a critical role in determining the mix of coal, natural gas, and renewable generation—

Electricity generation from selected fuels
billion kilowatthours



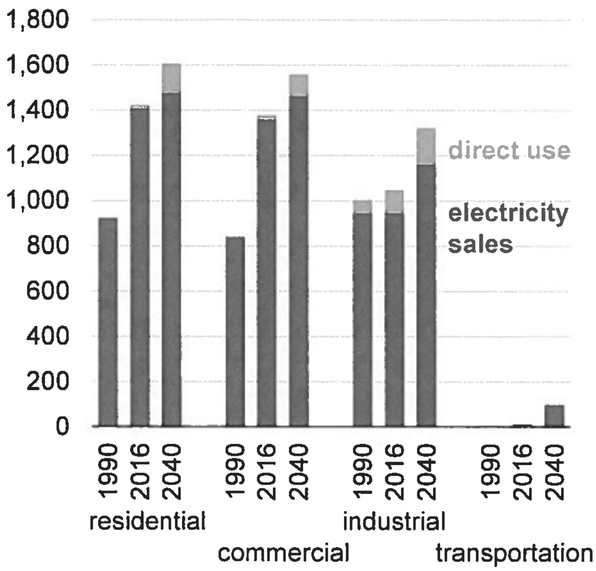
—as seen in the resource and technology cases

- Lower natural gas prices, which occur in the High Oil and Gas Resource and Technology case, lead to natural gas-fired electricity generation displacing coal-fired generation. In this case, and relative to the Reference case, natural gas maintains its market-share lead over coal through 2040, and it displaces some renewables market share relative to the Reference case.

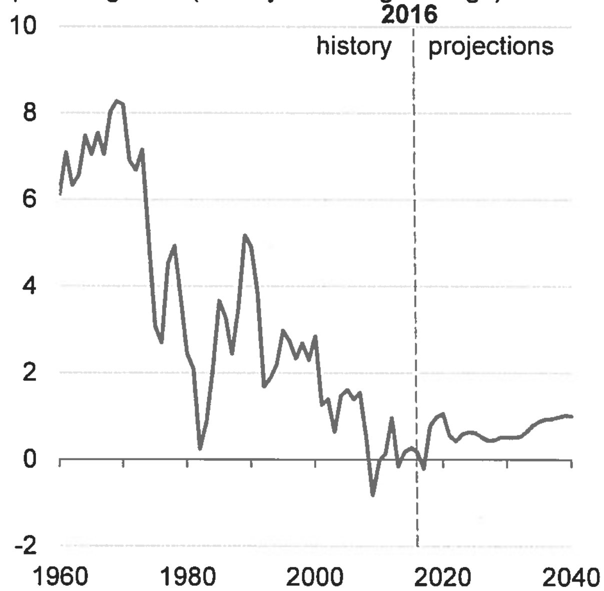
- Higher natural gas prices, which occur in the Low Oil and Gas Resource and Technology case, favor growth of renewables. Relative to the Reference case, coal-fired generation regains market share from natural gas in the near term, but because of carbon emission limits imposed by the Clean Power Plan, renewables ultimately gain a larger market share.

Electricity use continues to increase—

Electricity use by end-use demand sector
billion kilowatthours



Electricity use growth rate
percent growth (three-year rolling average)



—but the rate of growth remains lower than historic averages in the Reference case

- In recent history, the growth in electricity demand has slowed as older equipment was replaced with newer, more efficient stock, as efficiency standards were implemented and technology change occurred, particularly in lighting and other appliances. The demographic and economic factors driving this trend included slowing population growth and a shifting economy toward less energy-intensive industries.

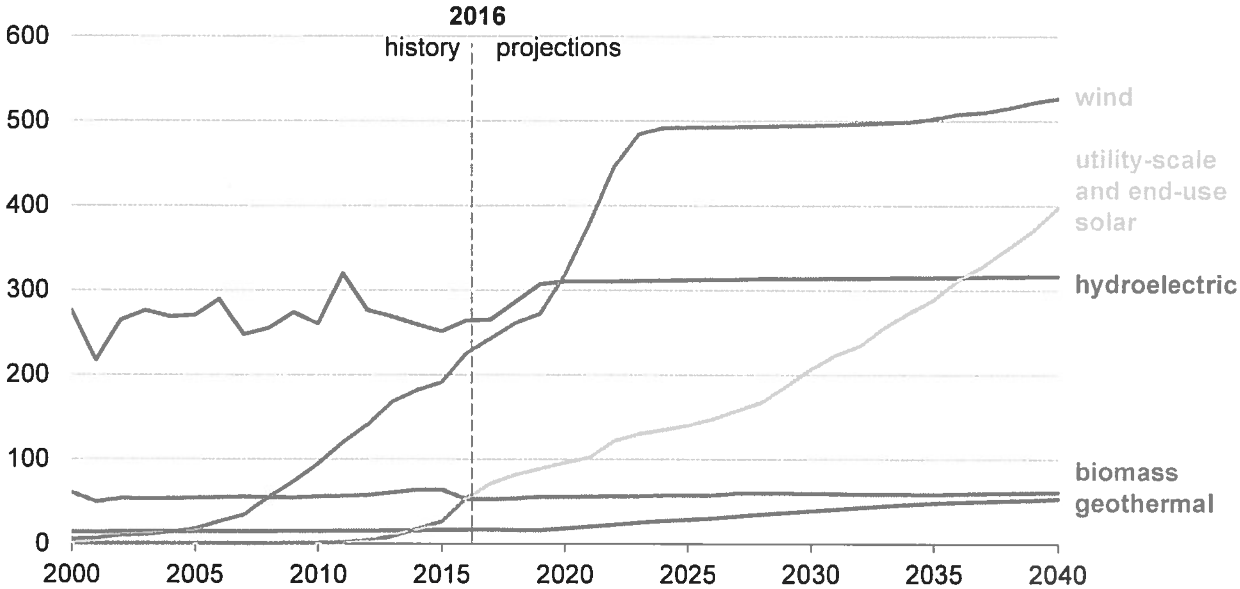
- While growth in the economy and electricity demand remain linked, historically the linkage has continued to shift toward much slower electricity demand growth relative to economic growth.

- Growth in electricity demand, while relatively low historically, begins to rise slowly across the projection period as demand for electric services is only partially offset by regulatory compliance and efficiency gains in electricity-using equipment.

- Growth in direct use generation above growth in sales is primarily the result of the adoption of rooftop photovoltaic (PV) and natural gas-fired combined heat and power (CHP).

Wind and solar generation become the predominant sources of renewable generation in the Reference case—

Renewable electricity generation (Reference case)
billion kilowatthours



—with each surpassing hydroelectric generation

- The Clean Power Plan (CPP) and state-defined Renewable Portfolio Standards (RPS) increase demand for wind and solar electricity generation throughout the projection period.

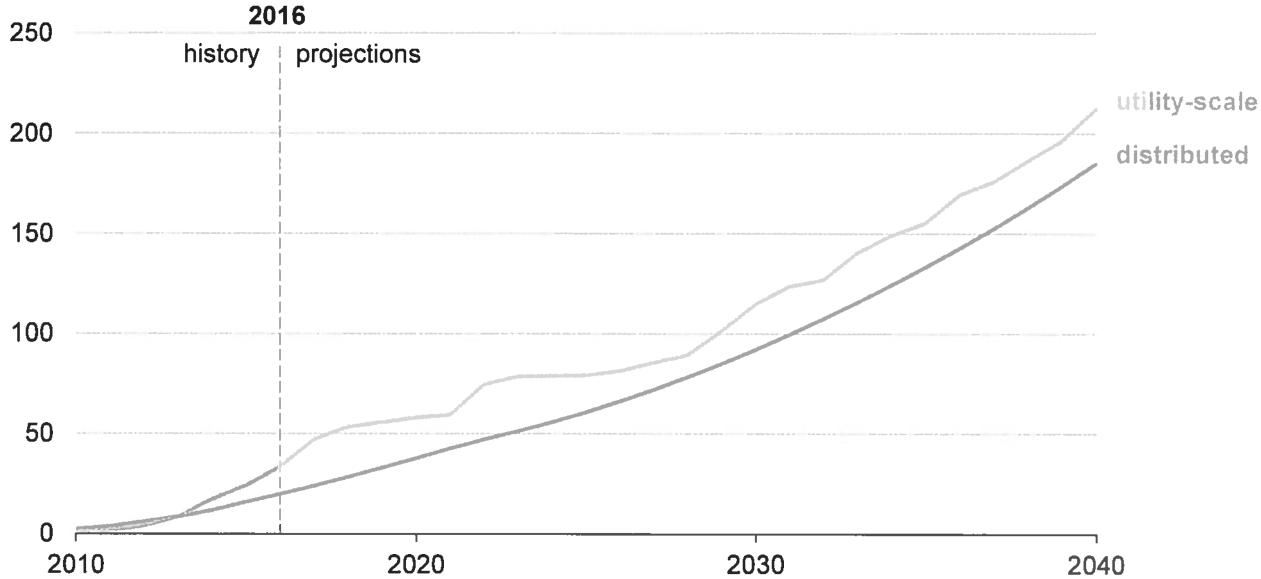
- The scheduled expiration of production tax credits encourages an increase in wind capacity additions ahead of CPP implementation. While many wind projects would be economic without the tax credits, most of the profitable wind capacity will be added to take advantage of the tax credits prior to their expiration.

- Substantial cost reductions, performance improvements, and a permanent 10% investment tax credit support solar generation growth throughout the projection period.

- Some geothermal resources are also competitive sources of new generation, but these lowest-cost resources are geographically limited and are only expected to be exploited slowly.

Most electric generation from solar resources comes from utility-scale installations—

Solar electricity generation (Reference case)
billion kilowatthours



—but generation from distributed photovoltaics is a significant contributor

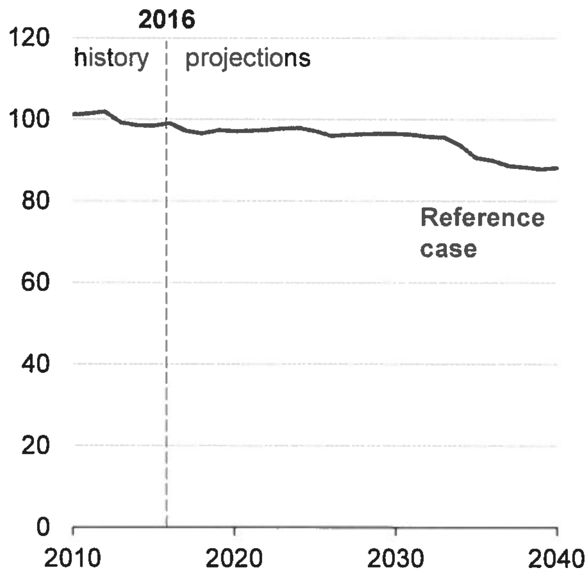
- Although utility-scale photovoltaic (PV) generation typically costs less than distributed PV, in some circumstances distributed PV remains economically attractive. Distributed PV competes against higher retail electricity prices, which do not necessarily reflect time-of-day or seasonal variation in the cost of electricity.

- With a continued (but reduced) tax credit, declining costs, and on-peak generation profile, both utility and distributed solar builds occur throughout the projection period.

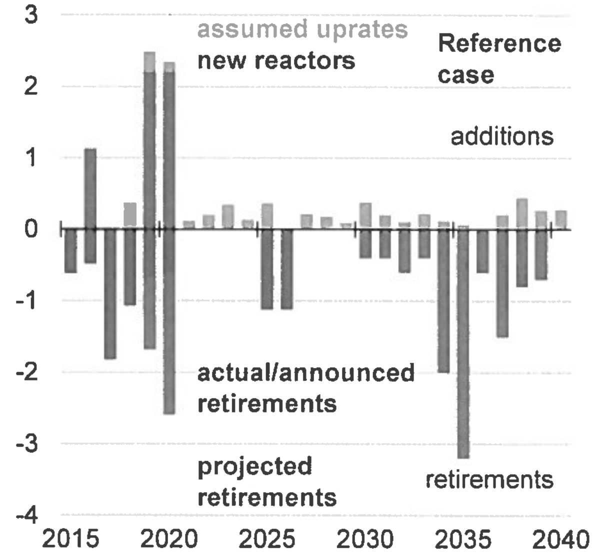
- AEO2017 projections include higher time-of-day and seasonal resolution of both utility-scale and distributed solar output as compared to AEO2016, as well as higher geographic resolution (at the ZIP code level) of distributed solar. The net result of these model changes is to reduce projected utility-scale solar generation and increase distributed solar generation, although not to the same degree.

Assumptions about license renewals in AEO2017 increase nuclear retirements—

Nuclear electricity generating capacity
gigawatts



Year-over-year nuclear capacity changes
gigawatts

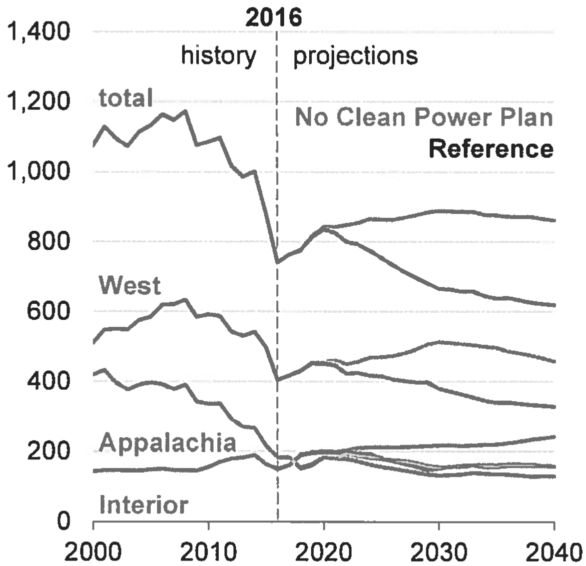


—leading to net nuclear capacity decreases

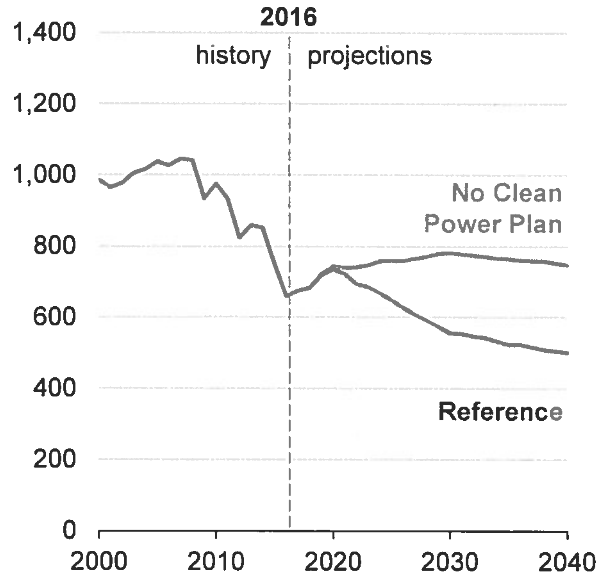
- No new, unannounced nuclear capacity is added in the Reference case over the projection period because of the combination of low natural gas prices, higher renewables penetration, low electricity load growth, and relatively high capital costs.
- New capacity additions are limited to reactors under construction from 2017 onward and to projected uprates at existing reactors. From 2018 through 2040, 4.7 gigawatts (GW) of additional capacity at existing units is projected to come online, based on an assessment of the remaining uprate potential.
- A significant reduction in nuclear capacity occurs because of 6.4 GW of total announced retirements; 3.0 GW of projected retirements in 2019–20 to address near-term, market uncertainty; and approximately 10.6 GW of long-term retirements through 2040 to address the uncertainty of reactors achieving a subsequent license renewal. As many nuclear plants reach the 60-year subsequent license renewal decision after 2040, retirements continue, with another 11.7 GW of nuclear capacity projected to retire by 2050.
- All nuclear plant retirements other than those already announced were modeled as capacity reductions for the regional nuclear fleets (i.e., as generic derates), rather than as retirements of specific plants.

Coal production decreases—

Coal production
million short tons



Coal consumption in electric power sector
million short tons



—primarily in the Western region

- The impacts of the Clean Power Plan (CPP) are not shared equally across the major coal supply regions because of differences in coal quality, regional natural gas and coal prices, and how the electricity markets served by each region are affected with respect to coal retirements and renewables penetration.

- Coal production increases through 2020 to more than 800 million short tons in the Reference case as a projected rise in natural gas prices improves the competitiveness of existing coal generating units.

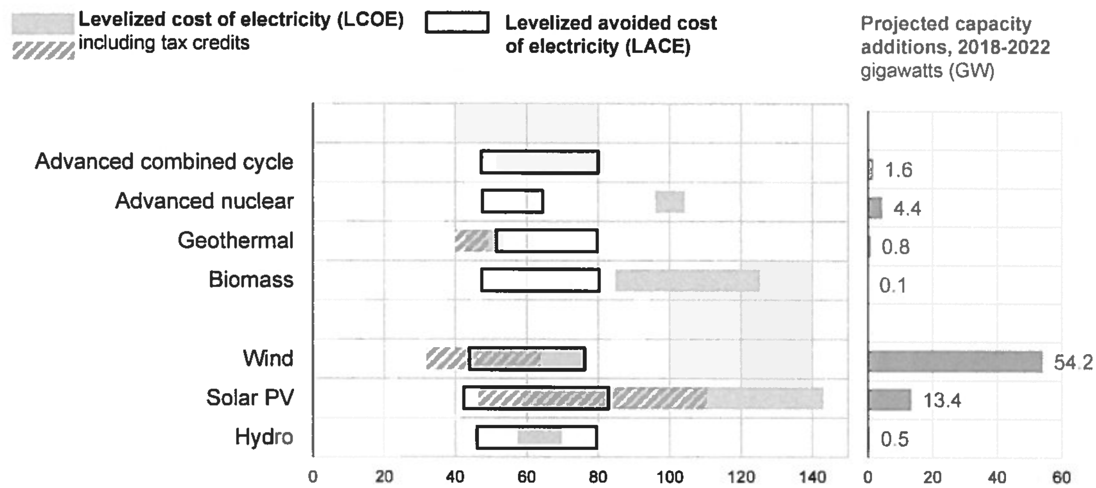
- After 2020, coal production in the Reference case declines, reaching nearly 620 million short tons per year in 2040, which is lower than the over 850 million short tons per year projected to be produced in 2040 in the No CPP case.

- The Interior region market share grows from 20% of U.S. coal production in 2016 to 26% by 2040, with Appalachia and Western production losing market share in both the Reference and No CPP cases.

- Coal production declines gradually after 2030 in the Reference case as retiring nuclear capacity is replaced, in part, by natural gas-fired electricity generation, requiring a reduction in existing carbon-emitting generation to maintain the CPP emission cap.

Including available federal tax credits, wind and solar units will be among the most competitive sources of new generation in 2022—

Levelized cost projections by technology, 2022
2016 dollars per megawatthour

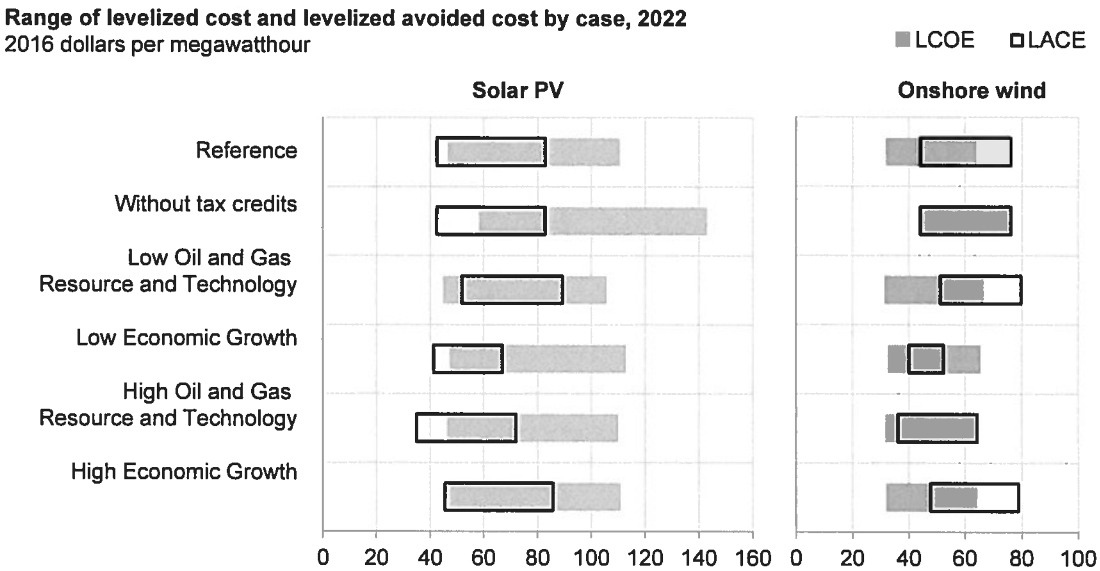


Source: *U.S. Energy Information Administration, Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2017*
Note: *Capacity additions include planned and unplanned additions.*

—when levelized costs of electricity and levelized avoided costs of electricity are considered

- Comparisons of levelized cost of electricity (LCOE) across technologies can be misleading as different technologies serve different market segments.
- Levelized avoided cost of electricity (LACE) can be used to compare the cost (LCOE) of an electricity generation resource against the value (LACE) of the electricity generation and capacity that it displaces.
- Wind plants entering service in 2022 that started construction in 2018 will receive an inflation-adjusted $14/MWh federal production tax credit; solar plants entering service in 2022 will receive a 26% investment tax credit, assuming a two-year construction lead time.
- See more information in EIA's LACE/LCOE report on EIA's website.

The value of energy (LACE) for wind and solar is more sensitive to differences in policy and market assumptions than the cost (LCOE)—



—particularly assumptions that affect natural gas price projections

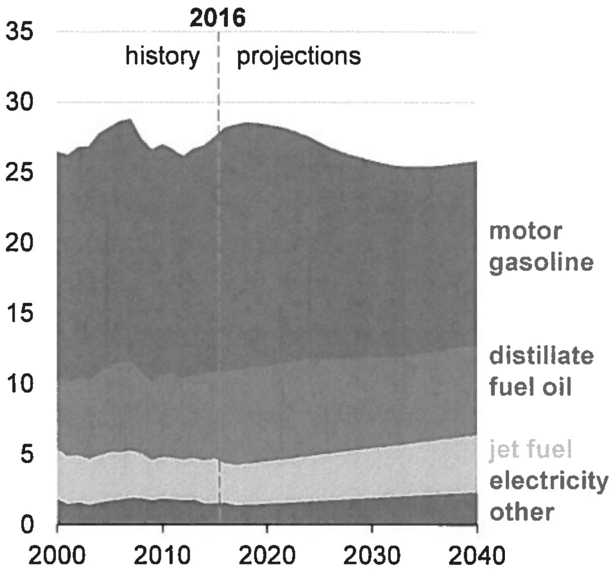
- The availability of tax credits affects the effective cost of generation from solar and wind, but other policies may affect value.
- High or low natural gas prices, as respectively reflected in the Low and High Oil and Gas Resource and Technology cases, affect the cost of generation that wind or solar displaces, and thus play a big role in determining the value of these resources to the electric grid.
- Faster demand growth under high macroeconomic growth conditions increases the value of new generation resources. Slower macroeconomic growth, leads to relatively flat demand growth and less demand for new generation.

Transportation

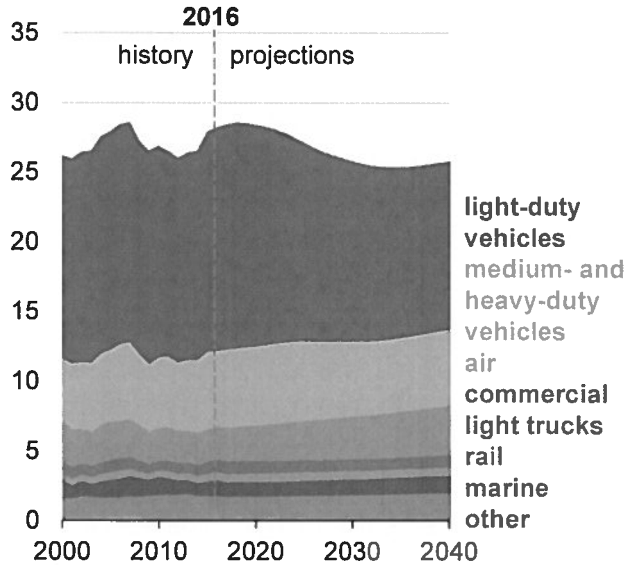
Transportation energy consumption peaks in 2018 in the Reference case because rising fuel efficiency outweighs increases in total travel and freight movements throughout the projection period.

Transportation energy use declines between 2018 and 2034 in the Reference case—

Transportation sector consumption
quadrillion British thermal units



Transportation sector consumption
quadrillion British thermal units

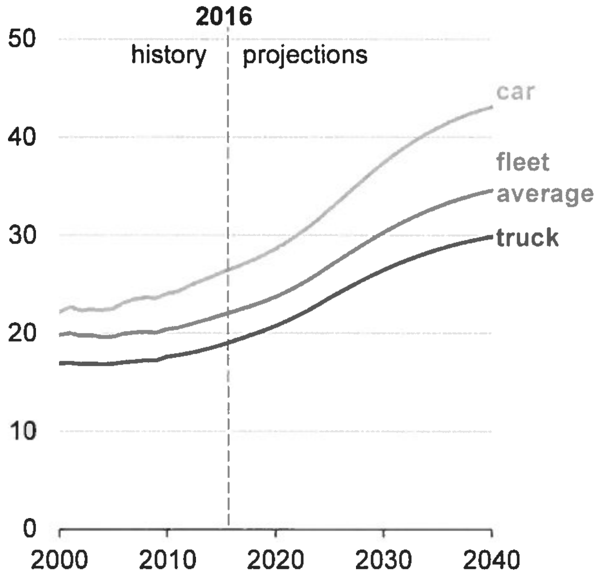


—driven by improvements in fuel economy

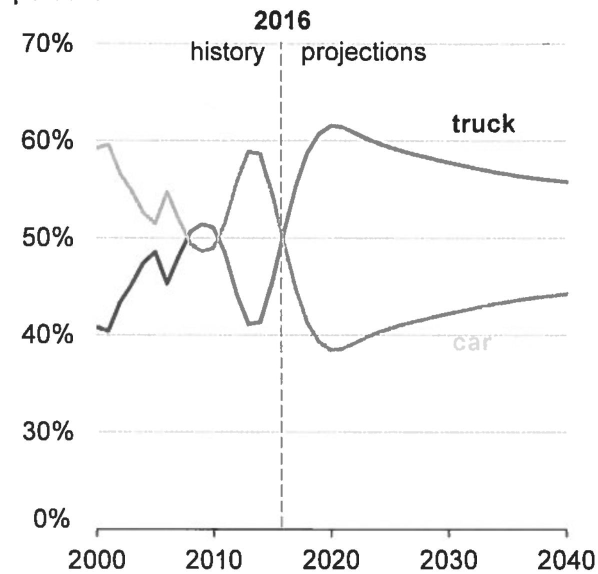
- Total transportation-related energy consumption peaks in 2018 in the Reference case and then declines through 2034 even as total travel and freight movement increases.
- Similarly, despite increases in light-duty travel, light-duty vehicle energy use also peaks in 2018 and then declines through 2040 as a result of higher fuel efficiency.
- Because the increase in freight travel demand is offset by rising fuel economy standards, heavy-duty vehicle energy consumption is approximately the same in 2040 as it was in 2016.
- Demand for air transport rises over the projection period, leading to an increase in energy used by air travel despite efficiency improvements.

Average light-duty fuel economy improves in the Reference case—

Light-duty stock fleet fuel economy
miles per gallon



Light-duty vehicle sales shares
percent



—even as the share of light-duty trucks increases

- Light-duty stock fuel economy is projected to rise from 22.2 miles per gallon (mpg) in 2016 to 34.6 mpg in 2040 in the Reference case. Current regulations require annual increases in fuel economy and reductions in greenhouse gas emissions through model year 2025, leading to a significant decrease in gasoline consumption.

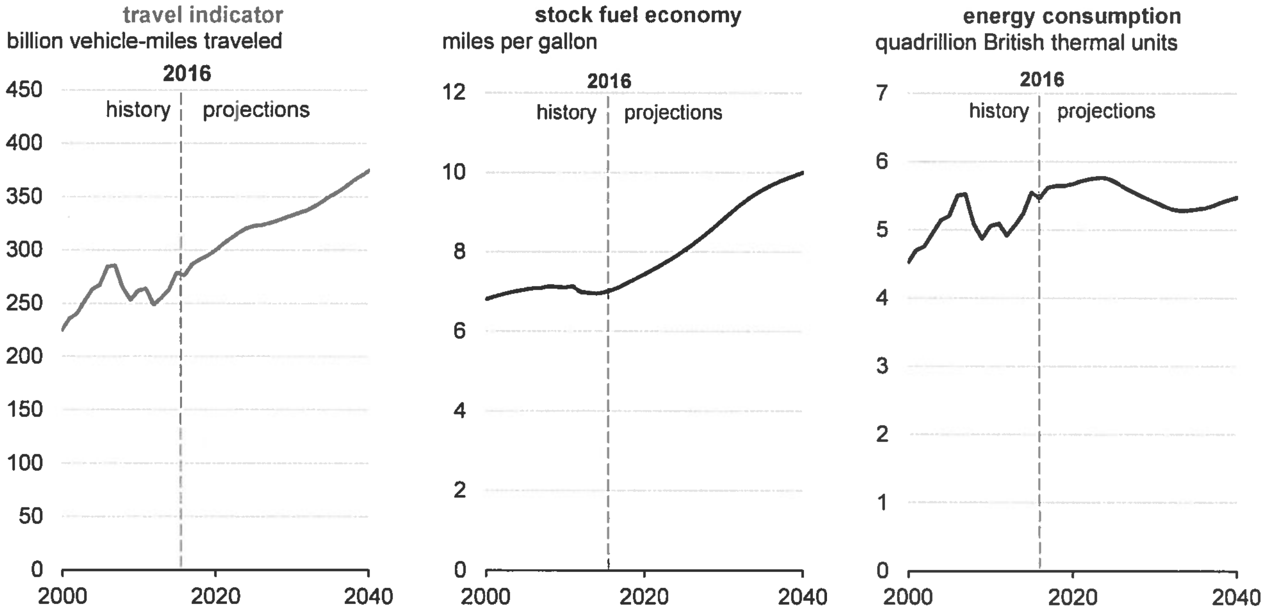
- The sales share of light-duty trucks, which have lower fuel economy compared with passenger vehicles, limits the increase of the average fuel economy of the light-duty fleet.

- The shift toward light-duty trucks is driven by lower fuel costs and a changing preference for pickup trucks and sport utility vehicles rather than cars.

- Light-duty truck sales decrease after 2018 with the rise in popularity of front-wheel drive crossover vehicles that are classified as passenger cars.

With the second phase of fuel efficiency regulations, medium- and heavy-duty vehicle energy consumption declines over 2023–33—

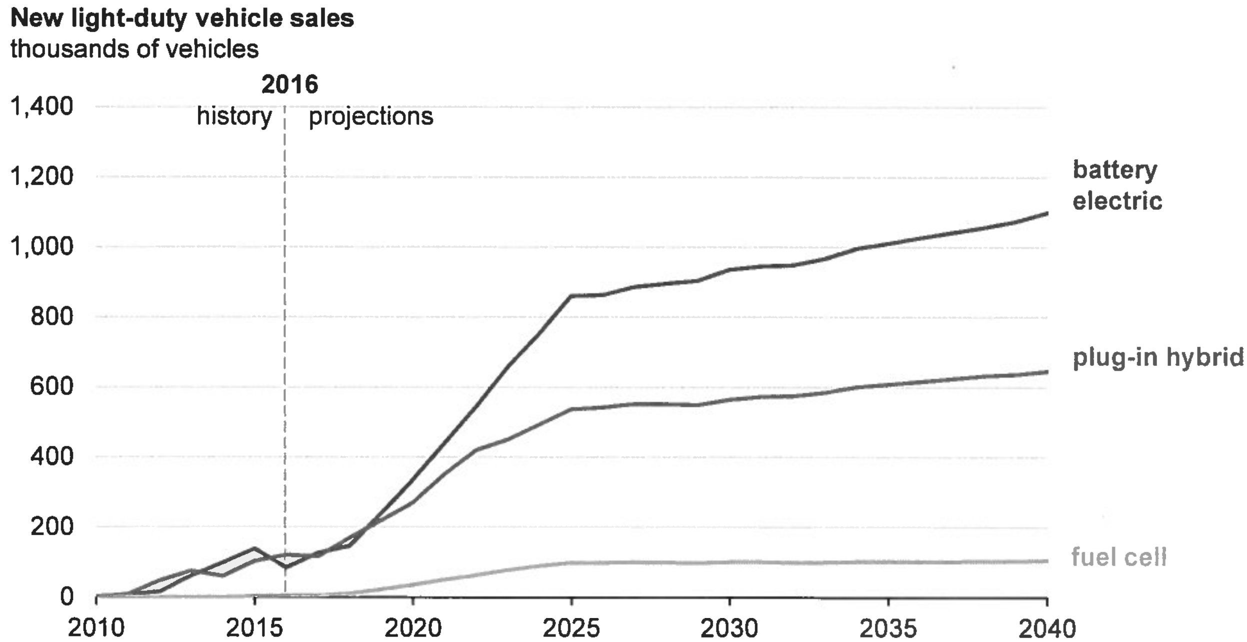
Medium- and heavy-duty vehicle metrics



—despite continued increase in miles traveled

- The second phase of the fuel efficiency and greenhouse gas regulations for medium- and heavy-duty vehicles takes full effect in 2027.
- Fuel economy of new medium- and heavy-duty vehicles increases by 38% from 2016–32 before leveling off, but stock fuel economy continues to increase through 2040 as less fuel efficient vehicles retire.
- Energy consumption from medium- and heavy-duty vehicles decreases from 2023 through 2033 before increasing in the Reference case, where fuel economy standards for trucks do not increase beyond 2027.
- Diesel remains the dominant fuel for trucks despite increasing use of alternative fuels.

Sales of battery electric, plug-in electric hybrid, and fuel cell vehicles increase in the Reference case—



—because of lower projected battery costs and existing state policies

- Battery electric vehicles (BEV) sales increase from less than 1% to 6% of total light-duty vehicles sold in the United States over 2016–40, and plug-in hybrid electric vehicle (PHEV) sales increase from less than 1% to 4% over the same period. Hydrogen fuel cell vehicle (FCV) sales grow to approximately 0.6% of sales by 2040.

- In 2025, projected sales of light-duty battery electric, plug-in hybrid electric, and hydrogen fuel cell vehicles reach 1.5 million, about 9% of projected total sales of light-duty vehicles.

- Regional programs such as California's Zero-Emission Vehicle regulation, which has been adopted by nine additional states, and California's SB-32, which requires a reduction in greenhouse gas emissions, spur alternative vehicle sales, especially electric and fuel cell vehicles.

- Updated data that indicate lower battery costs have increased EIA's outlook for BEV and PHEV sales.

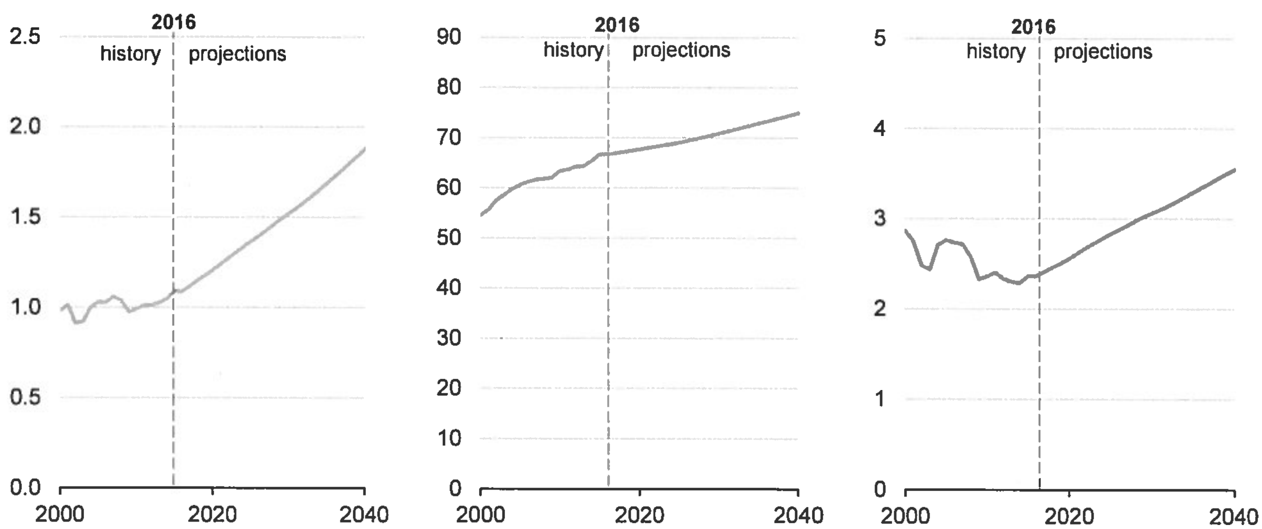
Even with improving commercial aircraft efficiency—

Air transportation metrics

travel indicator
trillion seat-miles available

stock fuel economy
seat-miles per gallon

jet fuel consumption
quadrillion British thermal units



—jet fuel use rises in the Reference case with increased travel

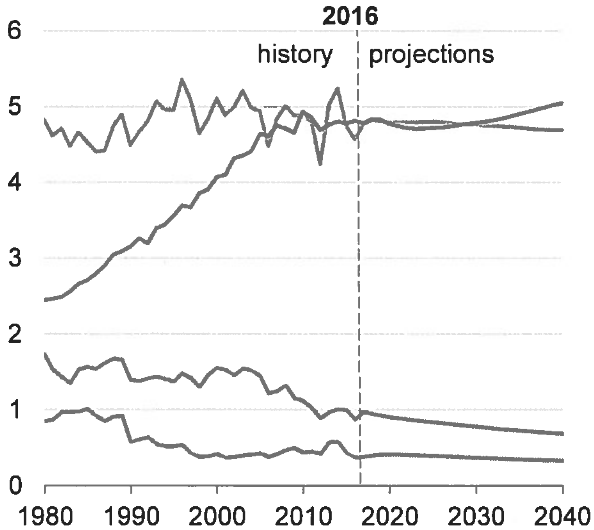
- Jet fuel consumption increases more than 40% between 2016 and 2040 in the Reference case, as demand for air travel more than offsets projected efficiency gains in aircraft.
- With slow fleet turnover, aircraft stock efficiencies rise more than 12% between 2016 and 2040, as measured by seat-miles per gallon.
- U.S. load factors (fraction of filled seats and cargo space) for domestic and U.S. international routes, which increased significantly over 1995–2010, are projected to remain relatively flat over 2016-40.
- Even with the rise in aircraft efficiency, U.S. seat-miles more than double and freight revenue ton-miles nearly double through 2040, yielding a net increase in jet fuel consumption in the transportation sector.

Buildings

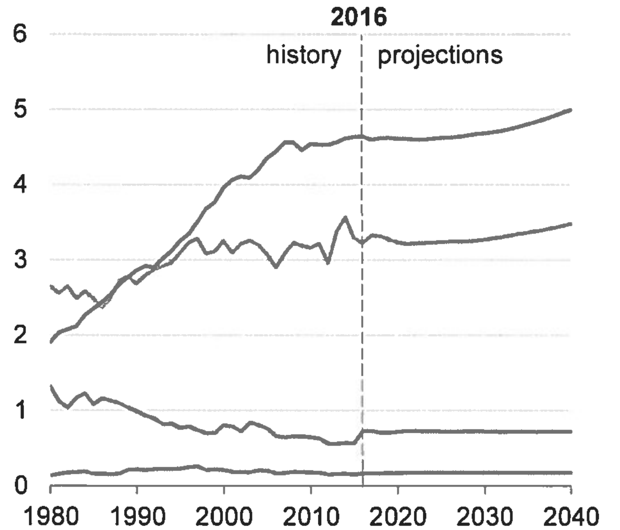
Despite growth in the number of households and the amount of commercial floorspace, improved equipment and efficiency standards contribute to residential and commercial consumption remaining relatively flat or declining slightly from 2016 to 2040 in the Reference case.

Residential and commercial fuel consumption are relatively stable in the Reference case—

Residential sector delivered energy consumption
quadrillion British thermal units



Commercial sector delivered energy consumption
quadrillion British thermal units



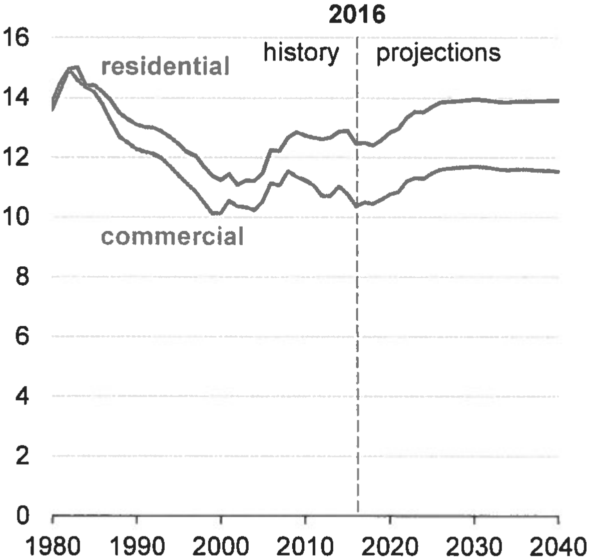
electricity natural gas **petroleum and other liquids** **other**

—as energy efficiency and other factors offset growth in end-use energy service demand

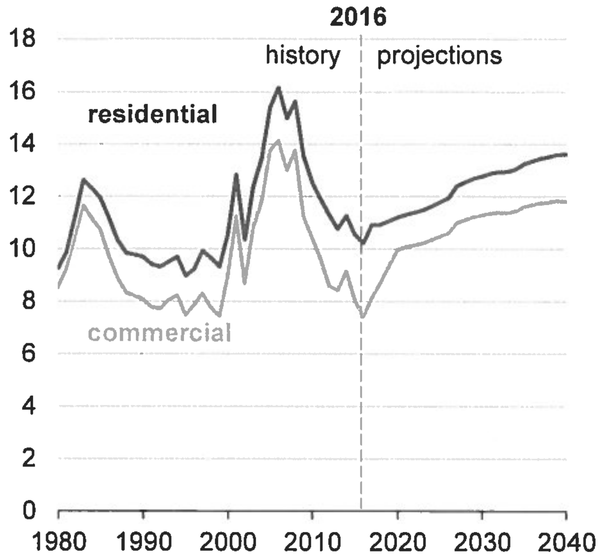
- Laws and regulations to introduce and update appliance standards and building codes have continued to increase energy efficiency in the residential and commercial sectors.
- Electricity demand in both sectors has been relatively flat in recent years, and it continues to be flat in the near term. Eventually, the increased adoption and saturation of new uses not currently covered by appliance standards increases consumption.
- Continued population shifts toward warmer parts of the country tend to lower heating demand and increase cooling demand. More energy is used for heating, so the result is a decrease in net delivered energy.
- Consumption of natural gas, used primarily for space heating, water heating, and cooking, has historically grown slower than electricity, and this trend generally continues through the projection.
- Use of petroleum-based fuels such as propane and heating oil continues to decline in the residential sector and remains relatively flat in the commercial sector.

Gradual increases in electricity and natural gas prices—

Electricity prices
2016 cents per kilowatthour



Natural gas prices
2016 dollars per thousand cubic feet

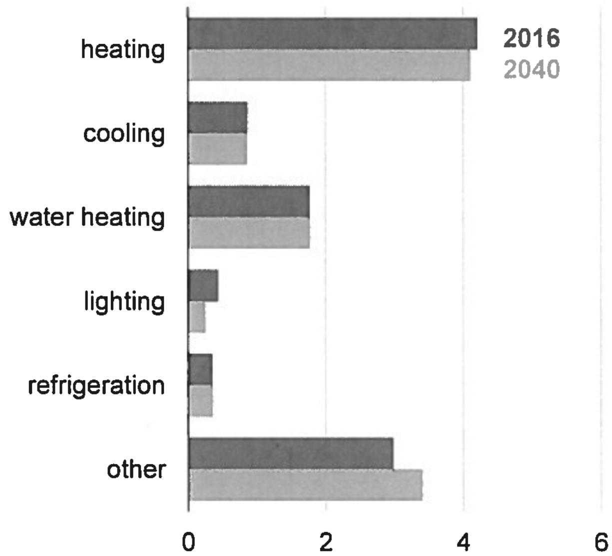


—affect residential and commercial energy consumption

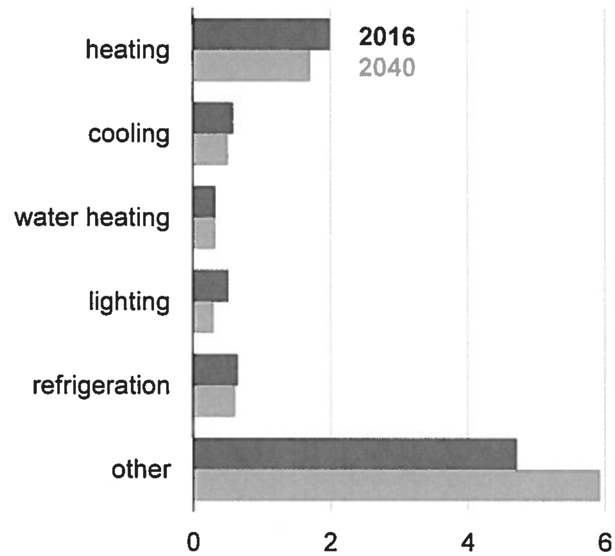
- Following modest price increases from 2016 to 2030 in both residential and commercial sectors, electricity prices stabilize after 2030.
- As electricity prices flatten from 2030 to 2040, along with factors such as geographic population shifts and floorspace growth, electricity consumption rises at an increased rate in both sectors.
- Residential natural gas consumption is relatively stable, despite steadily increasing residential natural gas prices.
- Commercial natural gas prices increase in the near term, while commercial natural gas consumption remains flat; in the longer term, as price increases slow after 2030, commercial natural gas consumption begins to increase.

Energy consumption decreases for most major end uses in the residential and commercial sectors—

Residential sector delivered energy consumption
quadrillion British thermal units



Commercial sector delivered energy consumption
quadrillion British thermal units

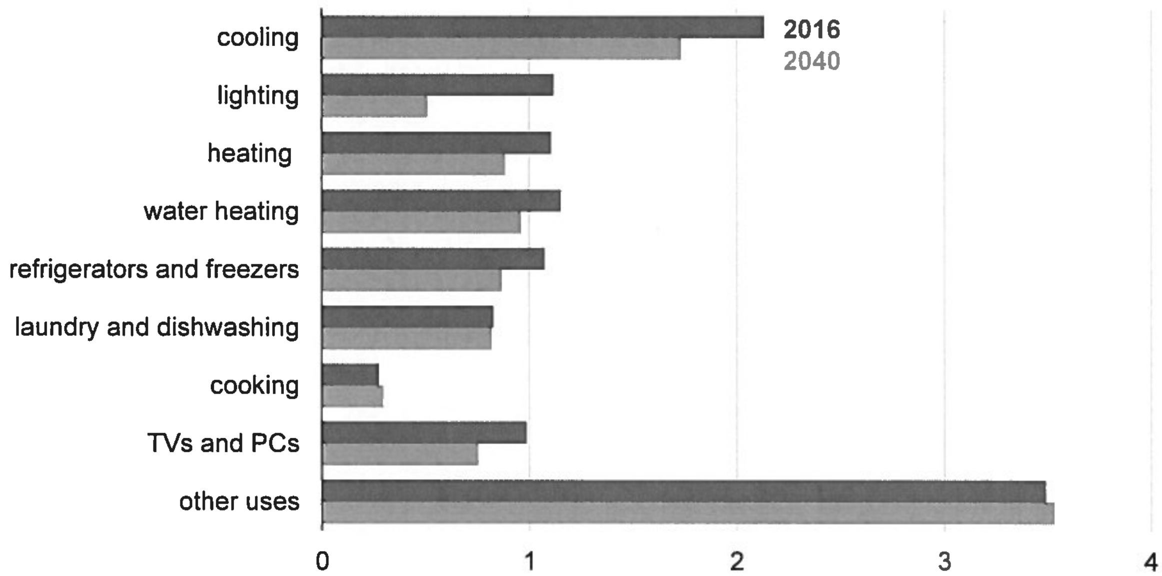


—with improved equipment efficiency and standards in the Reference case

- Energy consumption for lighting declines in the residential and commercial sectors as light-emitting diodes and compact fluorescent lamps continue to replace incandescent lamps and other bulb types.
- Energy consumption most residential and commercial applications either remains flat or declines slightly from 2016 to 2040 in the Reference case, despite growth in the number of households and the amount of commercial floorspace.
- Utility rebates contribute to a decrease in energy consumption. These rebates are expected to increase with the implementation of the Clean Power Plan (CPP) because energy efficiency programs are one of the available compliance strategies, and they are expected to grow more than they would in the absence of the CPP.
- In the residential sector, most of the growth in the *Other* category comes from increasing market penetration of smaller electric devices, most of which are not covered by efficiency standards.
- In the commercial sector, increased energy consumption for *Other* primarily reflects an increase in non-building uses such as telephone and technology networks.

Per-household electricity use continues to decline in the Reference case—

Residential electricity use per household
thousand kilowatthours per household

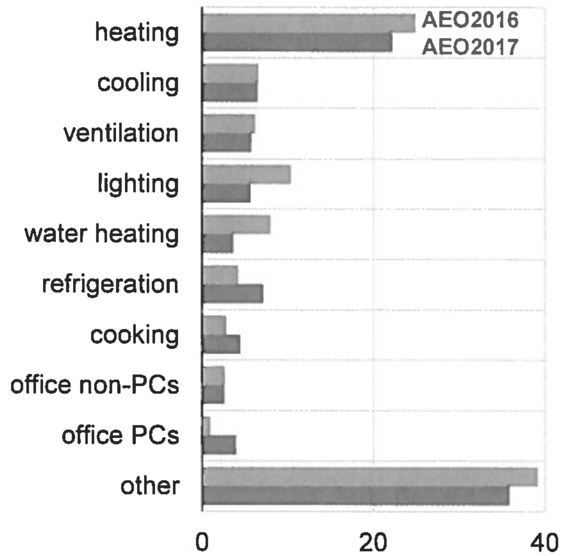


—led by efficiency improvements in lighting, cooling, and heating

- Electricity use per household continues to decrease in the Reference case, as household growth exceeds growth in residential electricity use.
- By 2040, the average household uses less than half as much electricity for lighting as they did in 2016, as customers replace incandescent bulbs with more energy efficient light-emitting diodes (LEDs) and compact fluorescent lamps (CFLs).
- Space cooling consumption for the average household declines by nearly 20%, as energy efficiency improvements more than offset the increased demand for space cooling.
- Per household electricity use by miscellaneous loads, a category that encompasses a wide range of equipment such as small electronic devices, home security systems, and pool pumps, increases slightly as efficiency improvements only partially offset the increased adoption and market penetration of new devices.
- Residential on-site electricity generation, mostly from photovoltaic solar panels, lowers total purchased delivered electricity from the electric grid.

AEO2017 includes new data from EIA's Commercial Buildings Energy Consumption Survey—

Commercial energy intensities, 2016
thousand British thermal units per square foot



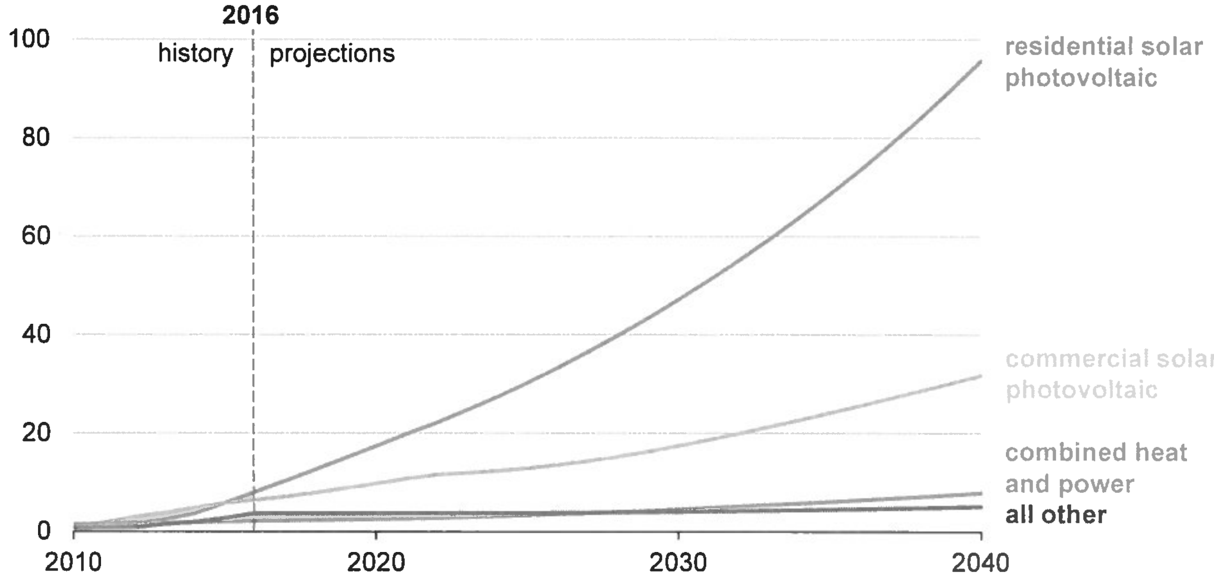
Commercial floorspace by type, 2016
million square feet

—leading to revisions in commercial building mix and energy consumption

- AEO2017 is based on the latest Commercial Buildings Energy Consumption Survey (CBECS), which was released during 2015 and 2016 and is the first update to be included in the AEO since AEO2007. The sample of buildings surveyed was drawn from the set of commercial buildings as of 2012.
- The latest CBECS provides a better understanding of the makeup of the commercial sector as well as the energy consumption associated with different end uses.
- Overall commercial floorspace is larger than previous estimates, especially for large offices and assembly buildings.
- Some end uses, particularly lighting and water heating, have changed significantly since the previous CBECS, which was based on the set of commercial buildings as of 2003 and did not consider as many building types as the latest CBECS.
- Categorization of some end uses in commercial buildings has changed. For instance, the category of office personal computers (PCs) now includes data center servers and all video screens; this equipment was previously categorized as *other end-uses*.

On-site electricity generation in residential and commercial buildings increases in the Reference case—

Buildings sector on-site electric generating capacity
gigawatts



—reflecting declining technology costs and the continued availability of incentives for solar technologies to all sectors through 2021

- Solar photovoltaic (PV) systems account for most of the growth in buildings-sector on-site (or distributed) electricity generation in the AEO2017.

- Solar PV adoption grows from a 2010 base of less than 2 gigawatts (GW) in the residential and commercial sectors to more than 125 GW of capacity in 2040 in the Reference case.

- Other technologies such as small wind and combined heat and power, mostly in the commercial sector, grow more slowly and reach about 13 GW of capacity by 2040.

- Federal investment tax credits for solar technologies currently cover 30% of installed cost through 2019, dropping to 26% in 2020 and to 22% in 2021. In 2022, residential tax credits expire, and commercial credits are reduced to 10%.

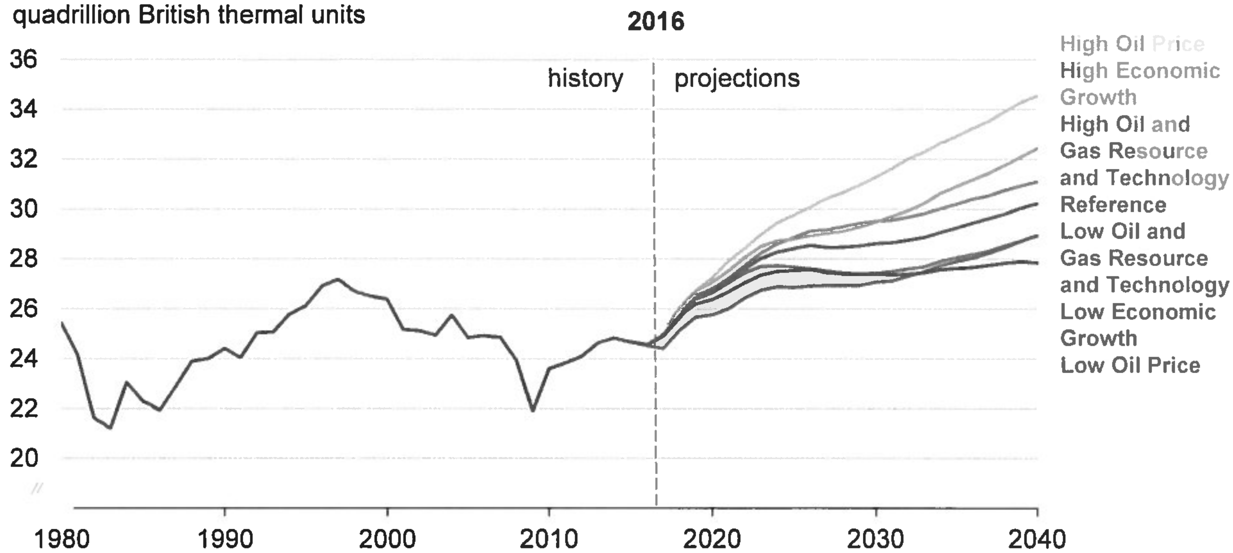
- The differences from AEO2016 come from expected technology cost declines and changes in the way that EIA projects buildings will employ solar PV over time (adoption modeling). Additionally, EIA's new residential PV adoption projection uses econometric modeling of ZIP code-level solar resources, electricity rates, and financial metrics.

Industrial

With economic growth and relatively low energy prices, energy consumption in EIA's three industrial sub-sectors (energy-intensive manufacturing, non-energy-intensive manufacturing, and nonmanufacturing) increases during the projection period across all cases. Energy intensity declines across all cases as a result of technological improvements.

Industrial delivered energy consumption grows in all cases—

Industrial energy consumption
quadrillion British thermal units

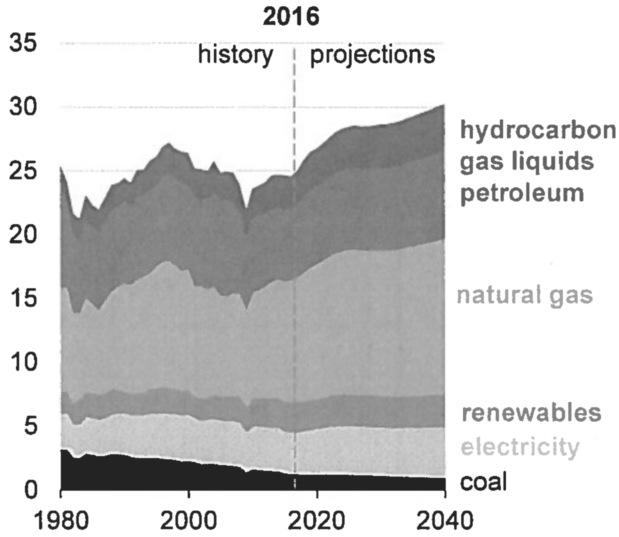


—but is highest in the High Oil Price case and the High Economic Growth cases over most of the projection

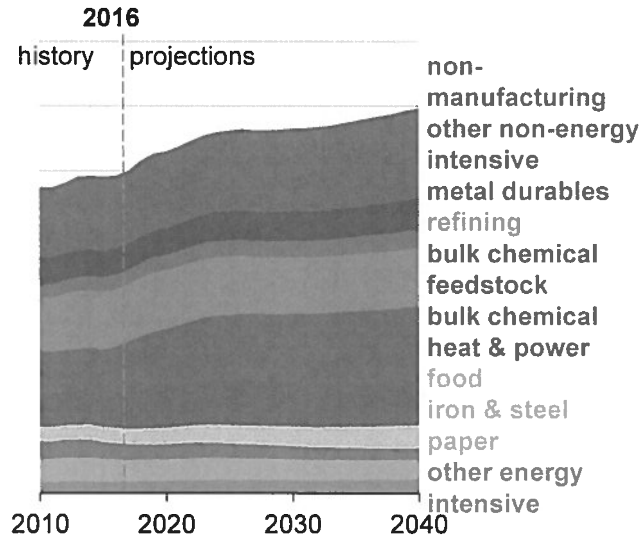
- Reference case industrial energy consumption is projected to grow more than 25%, from 26 to 32 quadrillion British thermal units between 2016 and 2040.
- Industrial energy consumption is greatest in the High Oil Price case. Although industrial energy use grows in all cases, more energy is used to produce steel, fabricated metal products, and machinery in the High Oil Price case than the Reference case because of greater demand for these products.
- Combined heat and power (CHP) generation in the High Oil Price case is about 26%, or about 53 billion kilowatthours, above the Reference case by 2040 largely because of higher CHP generation for coal-to-liquids and gas-to-liquids. Coal-to-liquids and gas-to-liquids are economical in the High Oil Price case in the mid-2020s and after.

Industrial sector energy consumption grows faster than in other demand sectors in the Reference case—

Industrial energy consumption
quadrillion British thermal units



Industrial energy consumption
quadrillion British thermal units



—led by increases in petroleum and natural gas consumption

- Driven by economic growth and supported by relatively low energy prices, industrial energy consumption in EIA's three main industrial sub-sectors (nonmanufacturing, energy-intensive manufacturing, and non-energy-intensive manufacturing) increases during the projection period across all cases.

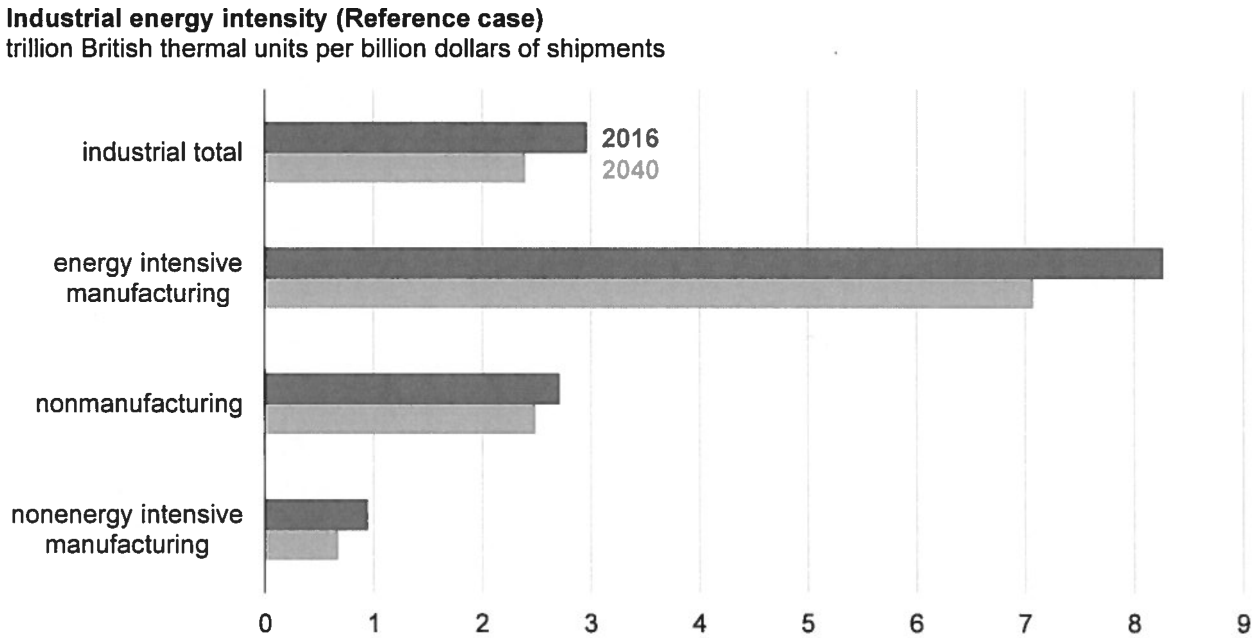
- Natural gas (used for heat and power in many industries) and petroleum (a feedstock for bulk chemicals) make up the majority of delivered industrial energy consumption, followed by purchased electricity, renewables, and coal.

- Total industrial energy consumption growth averages nearly 1% per year from 2016–40 in the Reference case, the highest growth rate of any demand sector, as economic growth exceeds efficiency gains.

- Industrial coal usage declines by 24% over the projection period as its use in combined heat and power (CHP) is largely replaced by lower-cost natural gas.

- Hydrocarbon gas liquids (HGL) such as ethane, propane, and butane are largely produced by processing liquids from wet natural gas wells. HGL, which are widely used as feedstock in chemical processes, are a major source of growth in overall industrial use of petroleum.

Industrial energy intensity declines across all subsectors—



—moderating energy consumption increases

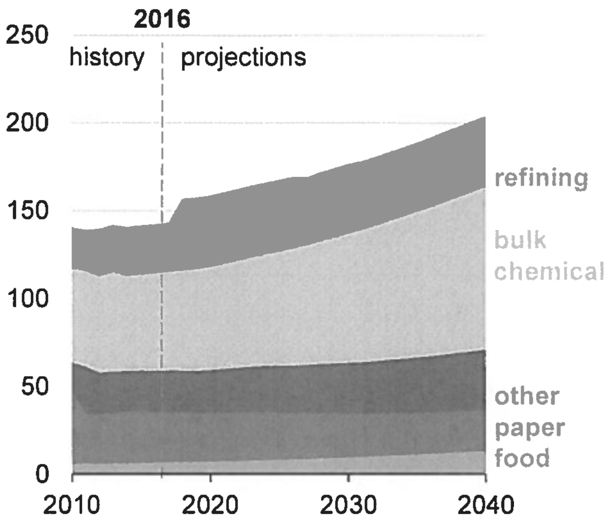
- Overall industrial energy intensity, measured as energy consumption per industrial shipment, declines by approximately 0.9% per year from 2016 to 2040 in the Reference case, consistent with historic trends.

- Manufacturing energy intensity declines as a result of continued efficiency gains in industrial equipment as well as a shift in the share of shipments from energy-intensive manufacturing industries to other industries.

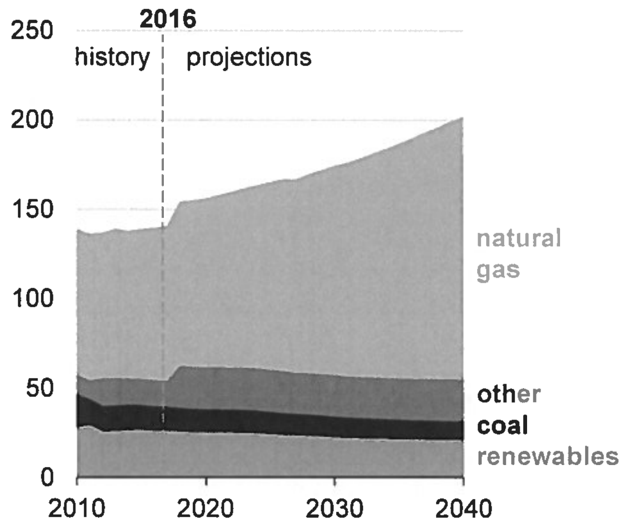
- Energy-intensive industries, which include food, paper, bulk chemical, glass, cement, iron and steel, and aluminum products, dominate overall industrial energy use consumption, accounting for less than 25% of industrial shipments but more than 60% of industrial energy use.

Industrial combined heat and power use grows in the Reference case—

Combined heat and power output
billion kilowatthours



Combined heat and power output
billion kilowatthours



—as bulk chemicals and food are the fastest growing industries through 2040

- Natural gas is the most common fuel used in combined heat and power (CHP), but renewables are used in the paper industry. Specialty fuels such as blast furnace gas and still gas are used in the iron and steel industry and the refining industry, respectively.
- Industrial CHP is most commonly found in large, steam-intensive industries, such as bulk chemicals, refining, paper, and food.
- The median size of an industrial sector CHP facility is 30 megawatts (MW), and an average size of 65 MW. CHP offsets approximately 0.5 quadrillion British thermal units (Btu) of purchased electricity in 2016 and 0.7 quadrillion Btu in 2040.

References

Contacts

AEO Working Groups

https://www.eia.gov/outlooks/aeo/workinggroup/

AEO Analysis and Forecasting Experts

https://www.eia.gov/about/contact/forecasting.php#longterm

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For more information

U.S. Energy Information Administration homepage | www.eia.gov

Short-Term Energy Outlook | www.eia.gov/steo

Annual Energy Outlook | www.eia.gov/aeo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

Today in Energy | www.eia.gov/todayinenergy

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London Interbank Offered Rates - Markets Data Center
10/25/17 12:48 PM

London Interbank Offered Rates

Wednesday, September 20, 2017 Find Historical Data | WHAT'S THIS?

Rates shown are effective 9/19/2017

			52-WEEK	
Libor Rates (USD)	**Latest**	**Wk ago**	**High**	**Low**
Libor Overnight	**1.17889**	1.17778	1.18000	0.41989
Libor 1 Week	**1.19667**	1.19667	1.20167	0.44788
Libor 1 Month	**1.23722**	1.23667	1.23889	0.52222
Libor 2 Month	**1.27167**	1.27222	1.27556	0.64438
Libor 3 Month	**1.32611**	1.31917	1.32611	0.83769
Libor 6 Month	**1.47861**	1.45444	1.47861	1.23363
Libor 1 Year	**1.74428**	1.70956	1.82761	1.55122

			52-WEEK	
Euro Libor Rates	**Latest**	**Wk ago**	**High**	**Low**
Euro Libor Overnight	**-0.42757**	-0.42757	-0.40000	-0.43043
Euro Libor 1 Week	**-0.40857**	-0.40857	-0.38029	-0.41643
Euro Libor 1 Month	**-0.40357**	-0.40357	-0.37400	-0.40500
Euro Libor 2 Month	**-0.38857**	-0.38714	-0.34343	-0.39214
Euro Libor 3 Month	**-0.37800**	-0.37571	-0.31929	-0.37800
Euro Libor 6 Month	**-0.30571**	-0.30429	-0.21129	-0.30800
Euro Libor 1 Year	**-0.22029**	-0.21543	-0.07114	-0.22029

			52-WEEK	
Pound Libor Rates	**Latest**	**Wk ago**	**High**	**Low**
Pound Libor Overnight	**0.22625**	0.22250	0.23063	0.21488
Pound Libor 1 Week	**0.23750**	0.23775	0.25338	0.23225
Pound Libor 1 Month	**0.25250**	0.25200	0.26875	0.24731
Pound Libor 2 Month	**0.28550**	0.26675	0.33538	0.26100
Pound Libor 3 Month	**0.33113**	0.29231	0.40644	0.27650
Pound Libor 6 Month	**0.47569**	0.41850	0.56694	0.39763
Pound Libor 1 Year	**0.71763**	0.61931	0.81744	0.58575

			52-WEEK	
Yen Libor Rates	**Latest**	**Wk ago**	**High**	**Low**
Yen Libor Spot/Next	**-0.04257**	-0.02114	-0.00443	-0.11567
Yen Libor 1 Week	**-0.04386**	-0.03143	0.01179	-0.10271
Yen Libor 1 Month	**-0.04864**	-0.04557	0.02600	-0.12257
Yen Libor 2 Month	**-0.04136**	-0.04079	0.03521	-0.12114
Yen Libor 3 Month	**-0.02950**	-0.03207	0.04150	-0.07600
Yen Libor 6 Month	**0.00150**	-0.00036	0.04750	-0.00771
Yen Libor 1 Year	**0.10600**	0.10686	0.14971	0.09243

n.a.- not available

Source: ICE Benchmark Administration Ltd. via SIX Financial Information

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10/25/17 12:48 PM

FEDERAL RESERVE press release

For release at 2 p.m. EDT September 20, 2017

Information received since the Federal Open Market Committee met in July indicates that the labor market has continued to strengthen and that economic activity has been rising moderately so far this year. Job gains have remained solid in recent months, and the unemployment rate has stayed low. Household spending has been expanding at a moderate rate, and growth in business fixed investment has picked up in recent quarters. On a 12-month basis, overall inflation and the measure excluding food and energy prices have declined this year and are running below 2 percent. Market-based measures of inflation compensation remain low; survey-based measures of longer-term inflation expectations are little changed, on balance.

Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. Hurricanes Harvey, Irma, and Maria have devastated many communities, inflicting severe hardship. Storm-related disruptions and rebuilding will affect economic activity in the near term, but past experience suggests that the storms are unlikely to materially alter the course of the national economy over the medium term. Consequently, the Committee continues to expect that, with gradual adjustments in the stance of monetary policy, economic activity will expand at a moderate pace, and labor market conditions will strengthen somewhat further. Higher prices for gasoline and some other items in the aftermath of the hurricanes will likely boost inflation temporarily; apart from that effect, inflation on a 12-month basis is expected to remain somewhat below 2 percent in the near term but to stabilize around the Committee's 2 percent objective over the medium term. Near-term risks to the economic outlook appear roughly balanced, but the Committee is monitoring inflation developments closely.

(more)

In view of realized and expected labor market conditions and inflation, the Committee decided to maintain the target range for the federal funds rate at 1 to 1-1/4 percent. The stance of monetary policy remains accommodative, thereby supporting some further strengthening in labor market conditions and a sustained return to 2 percent inflation.

In determining the timing and size of future adjustments to the target range for the federal funds rate, the Committee will assess realized and expected economic conditions relative to its objectives of maximum employment and 2 percent inflation. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial and international developments. The Committee will carefully monitor actual and expected inflation developments relative to its symmetric inflation goal. The Committee expects that economic conditions will evolve in a manner that will warrant gradual increases in the federal funds rate; the federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run. However, the actual path of the federal funds rate will depend on the economic outlook as informed by incoming data.

In October, the Committee will initiate the balance sheet normalization program described in the June 2017 Addendum to the Committee's Policy Normalization Principles and Plans.

Voting for the FOMC monetary policy action were: Janet L. Yellen, Chair; William C. Dudley, Vice Chairman; Lael Brainard; Charles L. Evans; Stanley Fischer; Patrick Harker; Robert S. Kaplan; Neel Kashkari; and Jerome H. Powell.

- 0 -

For release at 2 p.m. EDT September 20, 2017

Decisions Regarding Monetary Policy Implementation

The Federal Reserve has made the following decisions to implement the monetary policy stance announced by the Federal Open Market Committee in its statement on September 20, 2017:

- The Board of Governors of the Federal Reserve System voted unanimously to maintain the interest rate paid on required and excess reserve balances at 1.25 percent.

- As part of its policy decision, the Federal Open Market Committee voted to authorize and direct the Open Market Desk at the Federal Reserve Bank of New York, until instructed otherwise, to execute transactions in the System Open Market Account in accordance with the following domestic policy directive:

> "Effective September 21, 2017, the Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 1 to 1-1/4 percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.00 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of $30 billion per day.
>
> The Committee directs the Desk to continue rolling over at auction Treasury securities maturing during September, and to continue reinvesting in agency mortgage-backed securities the principal payments received through September from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities.
>
> Effective in October 2017, the Committee directs the Desk to roll over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds $6 billion, and to reinvest in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds $4 billion. Small deviations from these amounts for operational reasons are acceptable.

(more)

> The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions."

- In a related action, the Board of Governors of the Federal Reserve System voted unanimously to approve the establishment of the primary credit rate at the existing level of 1.75 percent.

This information will be updated as appropriate to reflect decisions of the Federal Open Market Committee or the Board of Governors regarding details of the Federal Reserve's operational tools and approach used to implement monetary policy.

More information regarding open market operations and the details of operational plans for reducing reinvestments may be found on the Federal Reserve Bank of New York's website.

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The Fed - H.15 - Selected Interest Rates \(Daily\) - Sept
10/25/17 12:48 PM

Selected Interest Rates (Daily) - H.15

H.15 Selected Interest Rates RSS DDP

The release is posted daily Monday through Friday at 4:15pm. The release is not posted on holidays or in the event that the Board is closed.

Release date: September 19, 2017

Selected Interest Rates

Yields in percent per annum

Instruments	2017 Sep 12	2017 Sep 13	2017 Sep 14	2017 Sep 15	2017 Sep 18
Federal funds (effective) 1 2 3	1.16	1.16	1.16	1.16	1.16
Commercial Paper 3 4 5 6					
Nonfinancial					
1-month	1.11	1.11	1.11	1.11	1.11
2-month	1.14	1.12	1.14	1.13	1.15
3-month	1.17	1.18	1.20	1.19	1.18
Financial					
1-month	1.19	1.19	1.09	1.20	n.a.
2-month	1.23	1.20	1.14	1.23	n.a.
3-month	1.26	1.24	1.19	1.26	1.28
Bank prime loan 2 3 7	4.25	4.25	4.25	4.25	4.25
Discount window primary credit 2 8	1.75	1.75	1.75	1.75	1.75
U.S. government securities					
Treasury bills (secondary market) 3 4					
4-week	0.98	0.98	0.97	0.96	0.94
3-month	1.02	1.02	1.03	1.03	1.04
6-month	1.14	1.14	1.15	1.15	1.16
1-year	1.24	1.24	1.25	1.27	1.27
Treasury constant maturities					
Nominal 9					
1-month	0.99	0.99	0.99	0.98	0.96
3-month	1.03	1.04	1.05	1.05	1.05
6-month	1.16	1.16	1.17	1.17	1.18
1-year	1.27	1.27	1.28	1.30	1.30
2-year	1.33	1.35	1.37	1.39	1.40
3-year	1.46	1.48	1.50	1.53	1.54
5-year	1.75	1.78	1.79	1.81	1.83
7-year	1.99	2.01	2.01	2.04	2.06
10-year	2.17	2.20	2.20	2.20	2.23
20-year	2.52	2.53	2.52	2.52	2.56
30-year	2.78	2.79	2.77	2.77	2.80
Inflation indexed 10					
5-year	0.08	0.10	0.09	0.09	0.09
7-year	0.27	0.29	0.28	0.28	0.27
10-year	0.33	0.35	0.35	0.35	0.36
20-year	0.65	0.67	0.65	0.65	0.67
30-year	0.85	0.87	0.85	0.84	0.86
Inflation-indexed long-term average 11	0.69	0.71	0.70	0.70	0.71

n.a.Not available.

Footnotes

1. As of March 1, 2016, the daily effective federal funds rate (EFFR) is a volume-weighted median of transaction-level data collected from depository institutions in the Report of Selected Money Market Rates (FR 2420). Prior to March 1, 2016, the EFFR was a volume-weighted mean of rates on brokered trades.

2. Weekly figures are averages of 7 calendar days ending on Wednesday of the current week; monthly figures include each calendar day in the month.

3. Annualized using a 360-day year or bank interest.

4. On a discount basis.

5. Interest rates interpolated from data on certain commercial paper trades settled by The Depository Trust Company. The trades represent sales of commercial paper by dealers or direct issuers to investors (that is, the offer side). The 1-, 2-, and 3-month rates are equivalent to the 30-, 60-, and 90-day dates reported on the Board's Commercial Paper Web page (www.federalreserve.gov/releases/cp/).

6. Financial paper that is insured by the FDIC's Temporary Liquidity Guarantee Program is not excluded from relevant indexes, nor is any financial or nonfinancial commercial paper that may be directly or indirectly affected by one or more of the Federal Reserve's liquidity facilities. Thus the rates published after September 19, 2008, likely reflect the direct or indirect effects of the new temporary programs and, accordingly, likely are not comparable for some purposes to rates published prior to that period.

7. Rate posted by a majority of top 25 (by assets in domestic offices) insured U.S.-chartered commercial banks. Prime is one of several base rates used by banks to price short-term business loans.

8. The rate charged for discounts made and advances extended under the Federal Reserve's primary credit discount window program, which became effective January 9, 2003. This rate replaces that for adjustment credit, which was discontinued after January 8, 2003. For further information, see www.federalreserve.gov/boarddocs/press/bcreg/2002/200210312/default.htm. The rate reported is that for the Federal Reserve Bank of New York. Historical series for the rate on adjustment credit as well as the rate on primary credit are available at www.federalreserve.gov/releases/h15/data.htm.

9. Yields on actively traded non-inflation-indexed issues adjusted to constant maturities. The 30-year Treasury constant maturity series was discontinued on February 18, 2002, and reintroduced on February 9, 2006. From February 18, 2002, to February 9, 2006, the U.S. Treasury published a factor for adjusting the daily nominal 20-year constant maturity in order to estimate a 30-year nominal rate. The historical adjustment factor can be found at www.treasury.gov/resource-center/data-chart-center/interest-rates/. Source: U.S. Treasury.

10. Yields on Treasury inflation protected securities (TIPS) adjusted to constant maturities. Source: U.S. Treasury. Additional information on both nominal and inflation-indexed yields may be found at www.treasury.gov/resource-center/data-chart-center/interest-rates/.

11. Based on the unweighted average bid yields for all TIPS with remaining terms to maturity of more than 10 years.

Note: Current and historical H.15 data, along with weekly, monthly, and annual averages, are available on the Board's Data Download Program (DDP) at www.federalreserve.gov/datadownload/Choose.aspx?rel=H15). Weekly, monthly and annual rates are averages of business days unless otherwise noted.

Description of the Treasury Nominal and Inflation-Indexed Constant Maturity Series

Yields on Treasury nominal securities at "constant maturity" are interpolated by the U.S. Treasury from the daily yield curve for non-inflation-indexed Treasury securities. This curve, which relates the yield on a security to its time to maturity, is based on the closing market bid yields on actively traded Treasury securities in the over-the-counter market. These market yields are calculated from composites of quotations obtained by the Federal Reserve Bank of New York. The constant maturity yield values are read from the yield curve at fixed maturities, currently 1, 3, and 6 months and 1, 2, 3, 5, 7, 10, 20, and 30 years. This method provides a yield for a 10-year maturity, for example, even if no outstanding security has exactly 10 years remaining to maturity. Similarly, yields on inflation-indexed securities at "constant maturity" are interpolated from the daily yield curve for Treasury inflation protected securities in the over-the-counter market. The inflation-indexed constant maturity yields are read from this yield curve at fixed maturities, currently 5, 7, 10, 20, and 30 years.

Last Update: September 19, 2017

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Corporate Bond Yield Averages

	AV. CORP.	CORPORATE BY RATINGS Aaa	Aa	A	Baa	CORPORATE BY GROUPS P.U.	IND.	R.R.		PUBLIC UTILITY BONDS Aaa	Aa	A	Baa		INDUSTRIAL BONDS Aaa	Aa	A	Baa		RAILROAD BONDS Aaa	Aa	A	Baa
2002																							
Jan.	7.38	6.55	7.03	7.50	7.87	7.69	7.07	---	Jan.	----	7.28	7.66	8.13	Jan.	6.55	6.78	7.35	7.60	Jan.	----	----	----	----
Feb.	7.32	6.51	6.95	7.37	7.89	7.62	7.02	---	Feb.	----	7.14	7.54	8.18	Feb.	6.51	6.76	7.20	7.59	Feb.	----	----	----	----
Mar.	7.57	6.81	7.22	7.62	8.11	7.83	7.30	---	Mar.	----	7.42	7.76	8.32	Mar.	6.81	7.02	7.47	7.89	Mar.	----	----	----	----
Apr.	7.49	6.76	7.16	7.49	8.04	7.74	7.23	---	Apr.	----	7.38	7.57	8.26	Apr.	6.76	6.93	7.40	7.81	Apr.	----	----	----	----
May	7.49	6.75	7.20	7.43	8.09	7.76	7.22	---	May	----	7.43	7.52	8.33	May	6.75	6.95	7.33	7.84	May	----	----	----	----
June	7.36	6.64	7.08	7.25	7.96	7.67	7.06	---	June	----	7.33	7.42	8.26	June	6.64	6.83	7.09	7.67	June	----	----	----	----
July	7.27	6.53	6.98	7.14	7.90	7.54	6.99	---	July	----	7.22	7.31	8.07	July	6.53	6.74	6.97	7.71	July	----	----	----	----
Aug.	7.06	6.37	6.84	6.95	7.58	7.34	6.77	---	Aug.	----	7.10	7.17	7.74	Aug.	6.37	6.57	6.73	7.42	Aug.	----	----	----	----
Sep.	6.87	6.15	6.63	6.76	7.40	7.23	6.51	---	Sep.	----	6.98	7.08	7.62	Sep.	6.15	6.27	6.43	7.17	Sep.	----	----	----	----
Oct.	7.08	6.33	6.74	6.95	7.74	7.43	6.72	---	Oct.	----	7.07	7.23	8.00	Oct.	6.33	6.40	6.67	7.48	Oct.	----	----	----	----
Nov.	7.01	6.31	6.71	6.89	7.62	7.31	6.70	---	Nov.	----	7.03	7.14	7.76	Nov.	6.31	6.39	6.63	7.47	Nov.	----	----	----	----
Dec.	6.90	6.21	6.63	6.80	7.45	7.20	6.59	---	Dec.	----	6.94	7.07	7.61	Dec.	6.21	6.32	6.53	7.28	Dec.	----	----	----	----
2003																							
Jan.	6.84	6.17	6.59	6.76	7.35	7.13	6.54	----	Jan.	----	6.87	7.06	7.47	Jan.	6.17	6.30	6.46	7.23	Jan.	----	----	----	----
Feb.	6.62	5.95	6.34	6.63	7.06	6.92	6.31	----	Feb.	----	6.66	6.93	7.17	Feb.	5.95	6.02	6.33	6.94	Feb.	----	----	----	----
Mar.	6.53	5.89	6.28	6.54	6.95	6.80	6.26	----	Mar.	----	6.56	6.79	7.05	Mar.	5.89	6.04	6.30	6.84	Mar.	----	----	----	----
Apr.	6.44	5.74	6.22	6.45	6.85	6.68	6.18	----	Apr.	----	6.47	6.64	6.94	Apr.	5.74	5.97	6.26	6.76	Apr.	----	----	----	----
May	6.02	5.22	5.85	6.08	6.38	6.35	5.70	----	May	----	6.20	6.36	6.47	May	5.22	5.48	5.79	6.29	May	----	----	----	----
June	5.85	4.97	5.72	5.92	6.19	6.21	5.49	----	June	----	6.12	6.21	6.30	June	4.97	5.31	5.62	6.07	June	----	----	----	----
July	6.26	5.49	6.07	6.34	6.62	6.54	5.98	----	July	----	6.37	6.57	6.67	July	5.49	5.77	6.11	6.56	July	----	----	----	----
Aug.	6.57	5.87	6.31	6.63	7.01	6.78	6.35	----	Aug.	----	6.48	6.78	7.08	Aug.	5.87	6.13	6.48	6.92	Aug.	----	----	----	----
Sep.	6.37	5.72	6.13	6.42	6.79	6.58	6.16	----	Sep.	----	6.30	6.56	6.87	Sep.	5.72	5.95	6.27	6.71	Sep.	----	----	----	----
Oct.	6.32	5.70	6.11	6.33	6.73	6.50	6.14	----	Oct.	----	6.28	6.43	6.79	Oct.	5.70	5.94	6.23	6.67	Oct.	----	----	----	----
Nov.	6.27	5.65	6.08	6.28	6.66	6.44	6.09	----	Nov.	----	6.26	6.37	6.69	Nov.	5.65	5.91	6.18	6.63	Nov.	----	----	----	----
Dec.	6.20	5.65	6.02	6.19	6.60	6.36	6.04	----	Dec.	----	6.18	6.27	6.61	Dec.	5.62	5.85	6.11	6.58	Dec.	----	----	----	----
2004																							
Jan.	6.08	5.54	5.91	6.08	6.44	6.23	5.92	----	Jan.	----	6.06	6.15	6.47	Jan.	5.54	5.74	6.02	6.40	Jan.	----	----	----	----
Feb.	6.00	5.50	5.87	6.04	6.27	6.17	5.83	----	Feb.	----	6.10	6.15	6.28	Feb.	5.50	5.65	5.93	6.24	Feb.	----	----	----	----
Mar.	5.84	5.33	5.70	5.86	6.11	6.01	5.67	----	Mar.	----	5.93	5.97	6.12	Mar.	5.33	5.48	5.75	6.10	Mar.	----	----	----	----
Apr.	6.22	5.73	6.10	6.25	6.46	6.38	6.05	----	Apr.	----	6.33	6.35	6.46	Apr.	5.73	5.85	6.15	6.45	Apr.	----	----	----	----
May.	6.51	6.04	6.40	6.54	6.75	6.68	6.34	----	May.	----	6.66	6.62	6.75	May.	6.04	6.13	6.45	6.73	May.	----	----	----	----
June	6.42	6.01	6.21	6.42	6.78	6.53	6.31	----	June	----	6.30	6.46	6.84	June	6.01	6.12	6.37	6.72	June	----	----	----	----
July	6.24	5.82	6.02	6.23	6.62	6.34	6.13	----	July	----	6.09	6.27	6.67	July	5.82	5.94	6.18	6.57	July	----	----	----	----
Aug.	6.08	5.65	5.87	6.08	6.48	6.18	5.98	----	Aug.	----	5.95	6.14	6.45	Aug.	5.65	5.79	6.02	6.47	Aug.	----	----	----	----
Sep.	5.91	5.46	5.73	5.91	6.27	6.01	5.81	----	Sep.	----	5.79	5.98	6.27	Sep.	5.46	5.67	5.84	6.27	Sep.	----	----	----	----
Oct.	5.87	5.47	5.69	5.86	6.21	5.95	5.78	----	Oct.	----	5.74	5.94	6.17	Oct.	5.47	5.63	5.78	6.24	Oct.	----	----	----	----
Nov.	5.89	5.52	5.72	5.88	6.21	5.97	5.80	----	Nov.	----	5.79	5.97	6.16	Nov.	5.52	5.65	5.78	6.25	Nov.	----	----	----	----
Dec.	5.84	5.47	5.69	5.82	6.15	5.93	5.75	----	Dec.	----	5.78	5.92	6.10	Dec.	5.47	5.60	5.72	6.20	Dec.	----	----	----	----
2005																							
Jan.	5.72	5.36	5.58	5.68	6.02	5.80	5.63	----	Jan.	----	5.68	5.78	5.95	Jan.	5.36	5.48	5.58	6.08	Jan.	----	----	----	----
Feb.	5.55	5.20	5.44	5.51	5.82	5.64	5.45	----	Feb.	----	5.55	5.61	5.76	Feb.	5.20	5.32	5.40	5.87	Feb.	----	----	----	----
Mar.	5.77	5.40	5.64	5.73	6.06	5.86	5.67	----	Mar.	----	5.76	5.83	6.01	Mar.	5.40	5.53	5.63	6.11	Mar.	----	----	----	----
Apr.	5.65	5.33	5.44	5.58	6.05	5.72	5.58	----	Apr.	----	5.56	5.64	5.95	Apr.	5.33	5.31	5.52	6.15	Apr.	----	----	----	----
May	5.54	5.15	5.29	5.49	6.01	5.60	5.48	----	May	----	5.39	5.53	5.88	May	5.15	5.18	5.45	6.13	May	----	----	----	----
June	5.35	4.96	5.02	5.33	5.86	5.39	5.31	----	June	----	5.05	5.40	5.70	June	4.96	4.99	5.26	6.01	June	----	----	----	----
July	5.46	5.06	5.14	5.44	5.95	5.50	5.41	----	July	----	5.18	5.51	5.81	July	5.06	5.10	5.37	6.10	July	----	----	----	----
Aug.	5.49	5.09	5.20	5.48	5.96	5.51	5.46	----	Aug.	----	5.23	5.50	5.80	Aug.	5.09	5.16	5.45	6.12	Aug.	----	----	----	----
Sept.	5.53	5.13	5.24	5.50	6.03	5.54	5.51	----	Sept.	----	5.27	5.52	5.83	Sept.	5.13	5.21	5.47	6.22	Sept.	----	----	----	----
Oct.	5.77	5.34	5.46	5.75	6.29	5.79	5.74	----	Oct.	----	5.50	5.79	6.08	Oct.	5.34	5.42	5.70	6.49	Oct.	----	----	----	----
Nov.	5.86	5.42	5.55	5.83	6.39	5.88	5.83	----	Nov.	----	5.59	5.88	6.19	Nov.	5.42	5.52	5.78	6.59	Nov.	----	----	----	----
Dec.	5.81	5.38	5.51	5.84	6.33	5.83	5.80	----	Dec.	----	5.55	5.80	6.14	Dec.	5.38	5.45	5.88	6.51	Dec.	----	----	----	----
2006																							
Jan.	5.75	5.29	5.45	5.79	6.24	5.77	5.73	----	Jan.	----	5.50	5.75	6.06	Jan.	5.29	5.39	5.83	6.41	Jan.	----	----	----	----
Feb.	5.80	5.35	5.51	5.85	6.27	5.83	5.78	----	Feb.	----	5.55	5.82	6.11	Feb.	5.35	5.46	5.87	6.43	Feb.	----	----	----	----
Mar.	5.95	5.52	5.67	5.98	6.41	5.98	5.92	----	Mar.	----	5.71	5.98	6.26	Mar.	5.52	5.64	5.96	6.55	Mar.	----	----	----	----
Apr.	6.26	5.84	6.00	6.27	6.68	6.28	6.23	----	Apr.	----	6.02	6.29	6.54	Apr.	5.84	5.98	6.26	6.82	Apr.	----	----	----	----
May	6.36	5.95	6.13	6.40	6.75	6.39	6.33	----	May	----	6.16	6.42	6.59	May	5.95	6.10	6.37	6.90	May	----	----	----	----
June	6.35	5.89	6.11	6.39	6.78	6.39	6.31	----	June	----	6.16	6.40	6.61	June	5.89	6.05	6.36	6.94	June	----	----	----	----
July	6.33	5.85	6.08	6.36	6.76	6.37	6.28	----	July	----	6.13	6.37	6.61	July	5.85	6.02	6.35	6.91	July	----	----	----	----
Aug.	6.16	5.68	5.91	6.19	6.59	6.20	6.11	----	Aug.	----	5.97	6.20	6.43	Aug.	5.68	5.85	6.18	6.74	Aug.	----	----	----	----
Sep.	5.98	5.51	5.75	5.98	6.43	6.03	5.94	----	Sep.	----	5.81	6.00	6.26	Sep.	5.51	5.68	5.95	6.59	Sep.	----	----	----	----
Oct.	5.97	5.51	5.74	5.94	6.42	6.01	5.93	----	Oct.	----	5.80	5.98	6.24	Oct.	5.51	5.68	5.90	6.60	Oct.	----	----	----	----
Nov.	5.78	5.33	5.57	5.76	6.20	5.82	5.73	----	Nov.	----	5.61	5.80	6.04	Nov.	5.33	5.52	5.72	6.36	Nov.	----	----	----	----
Dec.	5.79	5.29	5.58	5.78	6.22	5.83	5.74	----	Dec.	----	5.62	5.81	6.05	Dec.	5.29	5.53	5.75	6.38	Dec.	----	----	----	----
2007																							
Jan.	5.92	5.40	5.75	5.93	6.34	5.96	5.88	----	Jan.	----	5.78	5.96	6.16	Jan.	5.40	5.71	5.91	6.52	Jan.	----	----	----	----
Feb.	5.88	5.39	5.72	5.88	6.28	5.91	5.85	----	Feb.	----	5.73	5.90	6.10	Feb.	5.39	5.70	5.86	6.44	Feb.	----	----	----	----
Mar.	5.84	5.30	5.66	5.84	6.27	5.87	5.80	----	Mar.	----	5.66	5.85	6.10	Mar.	5.30	5.66	5.83	6.43	Mar.	----	----	----	----
Apr.	5.99	5.47	5.83	5.99	6.39	6.01	5.96	----	Apr.	----	5.83	5.97	6.24	Apr.	5.47	5.82	6.00	6.54	Apr.	----	----	----	----
May	6.00	5.47	5.85	6.01	6.39	6.03	5.97	----	May	----	5.86	5.99	6.23	May	5.47	5.84	6.04	6.54	May	----	----	----	----
June	6.32	5.79	6.17	6.33	6.70	6.34	6.29	----	June	----	6.18	6.30	6.54	June	5.79	6.15	6.36	6.84	June	----	----	----	----
July	6.26	5.73	6.09	6.30	6.65	6.28	6.24	----	July	----	6.11	6.25	6.49	July	5.73	6.07	6.34	6.81	July	----	----	----	----
Aug.	6.26	5.79	6.06	6.29	6.65	6.28	6.23	----	Aug.	----	6.11	6.24	6.51	Aug.	5.79	6.01	6.35	6.79	Aug.	----	----	----	----

Notes: Moody's® Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly -replenished population of nearly 75 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possi ble to 30 years; they are dropped from the list if their remaining life falls below 20 years, if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All y ields are yield-to-maturity calculated on a semi-annual basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Av erage Industrial and Average Public Utility observations. Because of the dearth of **Aaa** -rated railroad term bond issues, Moody's® **Aaa** railroad bond yield average was discontinued as of December 18, 1967. Moody's® **Aaa** public utility average suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.

Because of the dearth of Aaa rated public utility bond issues, Moody's Aaa public utility bond yield average was discontinued a s of December 10, 2001.

Note: October 2002 figures have been adjusted.

Note: January 2003 figures have been adjusted.

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Corporate Bond Yield Averages

	AV. CORP.	CORPORATE BY RATINGS Aaa	Aa	A	Baa	CORPORATE BY GROUPS P.U.	IND.	R.R.		PUBLIC UTILITY BONDS Aaa	Aa	A	Baa		INDUSTRIAL BONDS Aaa	Aa	A	Baa		RAILROAD BONDS Aaa	Aa	A	Baa
2006																							
Jan.	5.75	5.29	5.45	5.79	6.24	5.77	5.73	----	Jan.	----	5.50	5.75	6.06	Jan.	5.29	5.39	5.83	6.41	Jan.	----	----	----	----
Feb.	5.80	5.35	5.51	5.85	6.27	5.83	5.78	----	Feb.	----	5.55	5.82	6.11	Feb.	5.35	5.46	5.87	6.43	Feb.	----	----	----	----
Mar.	5.95	5.52	5.67	5.98	6.41	5.98	5.92	----	Mar.	----	5.71	5.98	6.26	Mar.	5.52	5.64	5.96	6.55	Mar.	----	----	----	----
Apr.	6.26	5.84	6.00	6.27	6.68	6.28	6.23	----	Apr.	----	6.02	6.29	6.54	Apr.	5.84	5.98	6.26	6.82	Apr.	----	----	----	----
May	6.36	5.95	6.13	6.40	6.75	6.39	6.33	----	May	----	6.16	6.42	6.59	May	5.95	6.10	6.37	6.90	May	----	----	----	----
June	6.35	5.89	6.11	6.39	6.78	6.39	6.31	----	June	----	6.16	6.40	6.61	June	5.89	6.05	6.36	6.94	June	----	----	----	----
July	6.33	5.85	6.08	6.36	6.76	6.37	6.28	----	July	----	6.13	6.37	6.61	July	5.85	6.02	6.35	6.91	July	----	----	----	----
Aug.	6.16	5.68	5.91	6.19	6.59	6.20	6.11	----	Aug.	----	5.97	6.20	6.43	Aug.	5.68	5.85	6.18	6.74	Aug.	----	----	----	----
Sept.	5.98	5.51	5.75	5.98	6.43	6.03	5.94	----	Sept.	----	5.81	6.00	6.26	Sept.	5.51	5.68	5.95	6.59	Sept.	----	----	----	----
Oct.	5.97	5.51	5.74	5.94	6.42	6.01	5.93	----	Oct.	----	5.80	5.98	6.24	Oct.	5.51	5.68	5.90	6.60	Oct.	----	----	----	----
Nov.	5.78	5.33	5.57	5.76	6.20	5.82	5.73	----	Nov.	----	5.61	5.80	6.04	Nov.	5.33	5.52	5.72	6.36	Nov.	----	----	----	----
Dec.	5.79	5.29	5.58	5.78	6.22	5.83	5.74	----	Dec.	----	5.62	5.81	6.05	Dec.	5.29	5.53	5.75	6.38	Dec.	----	----	----	----
2007																							
Jan.	5.92	5.40	5.75	5.93	6.34	5.96	5.88	----	Jan.	----	5.78	5.96	6.16	Jan.	5.40	5.71	5.91	6.52	Jan.	----	----	----	----
Feb.	5.88	5.39	5.72	5.88	6.28	5.91	5.85	----	Feb.	----	5.73	5.90	6.10	Feb.	5.39	5.70	5.86	6.44	Feb.	----	----	----	----
Mar.	5.84	5.30	5.66	5.84	6.27	5.87	5.80	----	Mar.	----	5.66	5.85	6.10	Mar.	5.30	5.66	5.83	6.43	Mar.	----	----	----	----
Apr.	5.99	5.47	5.83	5.99	6.39	6.01	5.96	----	Apr.	----	5.83	5.97	6.24	Apr.	5.47	5.82	6.00	6.54	Apr.	----	----	----	----
May	6.00	5.47	5.85	6.01	6.39	6.03	5.97	----	May	----	5.86	5.99	6.23	May	5.47	5.84	6.04	6.54	May	----	----	----	----
June	6.32	5.79	6.17	6.33	6.70	6.34	6.29	----	June	----	6.18	6.30	6.54	June	5.79	6.15	6.36	6.84	June	----	----	----	----
July	6.26	5.73	6.09	6.30	6.65	6.28	6.24	----	July	----	6.11	6.25	6.49	July	5.73	6.07	6.34	6.81	July	----	----	----	----
Aug.	6.26	5.79	6.06	6.29	6.65	6.28	6.23	----	Aug.	----	6.11	6.24	6.51	Aug.	5.79	6.01	6.35	6.79	Aug.	----	----	----	----
Sept.	6.21	5.74	6.02	6.23	6.59	6.24	6.17	----	Sept.	----	6.10	6.18	6.45	Sept.	5.74	5.93	6.28	6.73	Sept.	----	----	----	----
Oct.	6.12	5.66	5.94	6.13	6.48	6.17	6.06	----	Oct.	----	6.04	6.11	6.36	Oct.	5.66	5.84	6.14	6.60	Oct.	----	----	----	----
Nov.	5.97	5.44	5.78	5.97	6.40	6.04	5.90	----	Nov.	----	5.87	5.97	6.27	Nov.	5.44	5.67	5.97	6.51	Nov.	----	----	----	----
Dec.	6.15	5.49	5.91	6.19	6.65	6.23	6.07	----	Dec.	----	6.03	6.16	6.51	Dec.	5.49	5.78	6.22	6.78	Dec.	----	----	----	----
2008																							
Jan.	6.02	5.33	5.78	6.06	6.54	6.08	5.96	----	Jan.	----	5.87	6.02	6.35	Jan.	5.33	5.68	6.10	6.73	Jan.	----	----	----	----
Feb.	6.24	5.53	5.97	6.26	6.82	6.28	6.19	----	Feb.	----	6.04	6.21	6.60	Feb.	5.53	5.90	6.30	7.04	Feb.	----	----	----	----
Mar.	6.24	5.51	5.90	6.24	6.89	6.29	6.17	----	Mar.	----	5.99	6.21	6.68	Mar.	5.51	5.80	6.27	7.10	Mar.	----	----	----	----
Apr.	6.29	5.55	5.93	6.30	6.97	6.36	6.21	----	Apr.	----	5.99	6.29	6.81	Apr.	5.55	5.86	6.31	7.12	Apr.	----	----	----	----
May	6.30	5.57	6.00	6.30	6.92	6.38	6.22	----	May	----	6.07	6.27	6.79	May	5.57	5.93	6.33	7.05	May	----	----	----	----
June	6.42	5.68	6.11	6.43	7.07	6.50	6.35	----	June	----	6.19	6.38	6.93	June	5.68	6.02	6.48	7.22	June	----	----	----	----
July	6.44	5.67	6.05	6.47	7.16	6.50	6.38	----	July	----	6.13	6.40	6.97	July	5.67	5.97	6.54	7.35	July	----	----	----	----
Aug.	6.42	5.64	6.01	6.46	7.15	6.48	6.35	----	Aug.	----	6.09	6.37	6.98	Aug.	5.64	5.92	6.55	7.31	Aug.	----	----	----	----
Sept.	6.50	5.65	6.03	6.55	7.31	6.59	6.41	----	Sept.	----	6.13	6.49	7.15	Sept.	5.65	5.93	6.60	7.47	Sept.	----	----	----	----
Oct.	7.56	6.28	6.79	7.58	8.88	7.70	7.42	----	Oct.	----	6.95	7.56	8.58	Oct.	6.28	6.63	7.60	9.17	Oct.	----	----	----	----
Nov.	7.65	6.12	6.73	7.68	9.21	7.80	7.49	----	Nov.	----	6.83	7.60	8.98	Nov.	6.12	6.63	7.76	9.44	Nov.	----	----	----	----
Dec.	6.73	5.06	5.81	6.70	8.45	6.87	6.59	----	Dec.	----	5.93	6.54	8.13	Dec.	5.06	5.68	6.85	8.76	Dec.	----	----	----	----
2009																							
Jan.	6.59	5.05	5.84	6.46	8.14	6.77	6.41	----	Jan.	----	6.01	6.39	7.90	Jan.	5.05	5.67	6.52	8.39	Jan.	----	----	----	----
Feb.	6.64	5.27	6.02	6.47	8.08	6.72	6.56	----	Feb.	----	6.11	6.30	7.74	Feb.	5.27	5.93	6.62	8.42	Feb.	----	----	----	----
Mar.	6.84	5.50	6.11	6.66	8.42	6.85	6.83	----	Mar.	----	6.14	6.42	8.00	Mar.	5.50	6.07	6.90	8.84	Mar.	----	----	----	----
Apr.	6.85	5.39	6.17	6.70	8.39	6.90	6.79	----	Apr.	----	6.20	6.48	8.03	Apr.	5.39	6.14	6.90	8.74	Apr.	----	----	----	----
May	6.79	5.54	6.24	6.67	8.06	6.83	6.75	----	May	----	6.23	6.49	7.76	May	5.54	6.24	6.84	8.36	May	----	----	----	----
June	6.52	5.61	6.12	6.39	7.50	6.54	6.49	----	June	----	6.13	6.20	7.30	June	5.61	6.11	6.58	7.69	June	----	----	----	----
July	6.17	5.41	5.71	6.09	7.09	6.15	6.18	----	July	----	5.63	5.97	6.87	July	5.41	5.78	6.20	7.30	July	----	----	----	----
Aug.	5.83	5.26	5.45	5.78	6.58	5.80	5.86	----	Aug.	----	5.33	5.71	6.36	Aug.	5.26	5.56	5.84	6.79	Aug.	----	----	----	----
Sept.	5.61	5.13	5.21	5.56	6.31	5.60	5.62	----	Sept.	----	5.15	5.53	6.12	Sept.	5.13	5.27	5.58	6.50	Sept.	----	----	----	----
Oct.	5.63	5.15	5.24	5.57	6.29	5.64	5.61	----	Oct.	----	5.23	5.55	6.14	Oct.	5.15	5.25	5.59	6.44	Oct.	----	----	----	----
Nov.	5.68	5.19	5.29	5.64	6.32	5.71	5.64	----	Nov.	----	5.33	5.64	6.18	Nov.	5.19	5.26	5.64	6.46	Nov.	----	----	----	----
Dec.	5.78	5.26	5.44	5.77	6.37	5.86	5.71	----	Dec.	----	5.52	5.79	6.26	Dec.	5.26	5.36	5.74	6.47	Dec.	----	----	----	----
2010																							
Jan.	5.76	5.26	5.50	5.76	6.25	5.83	5.69	----	Jan.	----	5.55	5.77	6.16	Jan.	5.26	5.44	5.73	6.33	Jan.	----	----	----	----
Feb.	5.86	5.35	5.62	5.84	6.34	5.94	5.79	----	Feb.	----	5.69	5.87	6.25	Feb.	5.35	5.55	5.80	6.43	Feb.	----	----	----	----
Mar.	5.81	5.27	5.57	5.80	6.27	5.90	5.71	----	Mar.	----	5.64	5.84	6.22	Mar.	5.27	5.49	5.75	6.32	Mar.	----	----	----	----
Apr.	5.80	5.29	5.57	5.78	6.25	5.87	5.71	----	Apr.	----	5.62	5.81	6.19	Apr.	5.29	5.50	5.74	6.32	Apr.	----	----	----	----
May	5.52	4.96	5.25	5.49	6.05	5.59	5.44	----	May	----	5.29	5.50	5.97	May	4.96	5.19	5.47	6.13	May	----	----	----	----
June	5.52	4.88	5.16	5.44	6.23	5.62	5.42	----	June	----	5.22	5.46	6.18	June	4.88	5.11	5.42	6.28	June	----	----	----	----
July	5.32	4.72	4.96	5.25	6.01	5.41	5.23	----	July	----	4.99	5.26	5.98	July	4.72	4.92	5.23	6.04	July	----	----	----	----
Aug.	5.05	4.49	4.72	5.00	5.66	5.10	4.98	----	Aug.	----	4.75	5.01	5.55	Aug.	4.49	4.68	4.98	5.77	Aug.	----	----	----	----
Sept.	5.05	4.53	4.72	5.01	5.66	5.10	5.00	----	Sept.	----	4.74	5.01	5.53	Sept.	4.53	4.70	5.00	5.78	Sept.	----	----	----	----
Oct.	5.15	4.68	4.83	5.09	5.72	5.20	5.08	----	Oct.	----	4.89	5.10	5.62	Oct.	4.68	4.77	5.07	5.81	Oct.	----	----	----	----
Nov.	5.37	4.87	5.07	5.33	5.92	5.45	5.29	----	Nov.	----	5.12	5.37	5.85	Nov.	4.87	5.02	5.29	5.99	Nov.	----	----	----	----
Dec.	5.55	5.02	5.26	5.52	6.10	5.64	5.46	----	Dec.	----	5.32	5.56	6.04	Dec.	5.02	5.19	5.47	6.15	Dec.	----	----	----	----
2011																							
Jan.	5.56	5.04	5.26	5.53	6.09	5.64	5.46	----	Jan.	----	5.29	5.57	6.06	Jan.	5.04	5.22	5.48	6.11	Jan.	----	----	----	----
Feb.	5.66	5.22	5.37	5.64	6.15	5.73	5.58	----	Feb.	----	5.42	5.68	6.10	Feb.	5.22	5.31	5.59	6.19	Feb.	----	----	----	----
Mar.	5.55	5.13	5.28	5.52	6.03	5.62	5.48	----	Mar.	----	5.33	5.56	5.97	Mar.	5.13	5.22	5.48	6.09	Mar.	----	----	----	----
Apr.	5.56	5.16	5.29	5.52	6.02	5.62	5.49	----	Apr.	----	5.32	5.55	5.98	Apr.	5.16	5.25	5.48	6.06	Apr.	----	----	----	----
May	5.33	4.96	5.06	5.29	5.78	5.38	5.27	----	May	----	5.08	5.32	5.74	May	4.96	5.04	5.26	5.81	May	----	----	----	----
June	5.30	4.99	5.04	5.26	5.75	5.33	5.27	----	June	----	5.04	5.26	5.67	June	4.99	5.02	5.25	5.82	June	----	----	----	----
July	5.30	4.93	5.03	5.26	5.76	5.34	5.25	----	July	----	5.05	5.27	5.70	July	4.93	4.99	5.25	5.81	July	----	----	----	----
Aug.	4.79	4.37	4.47	4.74	5.36	4.78	4.79	----	Aug.	----	4.44	4.69	5.22	Aug.	4.37	4.50	4.79	5.49	Aug.	----	----	----	----
Sept.	4.60	4.09	4.23	4.54	5.27	4.61	4.58	----	Sept.	----	4.24	4.48	5.11	Sept.	4.09	4.21	4.59	5.42	Sept.	----	----	----	----
Oct.	4.60	3.98	4.16	4.54	5.37	4.66	4.54	----	Oct.	----	4.21	4.52	5.24	Oct.	3.98	4.11	4.56	5.50	Oct.	----	----	----	----
Nov.	4.39	3.87	3.97	4.34	5.14	4.37	4.41	----	Nov.	----	3.92	4.25	4.93	Nov.	3.87	4.01	4.43	5.34	Nov.	----	----	----	----
Dec.	4.47	3.93	4.03	4.40	5.25	4.47	4.47	----	Dec.	----	4.00	4.33	5.07	Dec.	3.93	4.06	4.46	5.43	Dec.	----	----	----	----

Notes: Moody's®Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly-replenished population of nearly 75 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possible to 30 years; they are dropped from the list if their remaining life falls below 20 years, if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of **Aaa** -rated railroad term bond issues, Moody's® **Aaa** railroad bond yield average was discontinued as of December 18, 1967. Moody's® **Aaa** public utility average suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.
Because of the dearth of Aaa rated public utility bond issues, Moody's Aaa public utility bond yield average was discontinued as of December 10, 2001.

KWalton

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Corporate Bond Yield Averages

	AV.	CORPORATE BY RATINGS				CORPORATE BY GROUPS				PUBLIC UTILITY BONDS					INDUSTRIAL BONDS					RAILROAD BONDS			
	CORP.	Aaa	Aa	A	Baa	P.U.	IND.	R.R.		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa
2010																								
Jan.	5.76	5.26	5.50	5.76	6.25	5.83	5.69	----	Jan.	----	5.55	5.77	6.16	Jan.	5.26	5.44	5.73	6.33	Jan.	----	----	----	----
Feb.	5.86	5.35	5.62	5.84	6.34	5.94	5.79	----	Feb.	----	5.69	5.87	6.25	Feb.	5.35	5.55	5.80	6.43	Feb.	----	----	----	----
Mar.	5.81	5.27	5.57	5.80	6.27	5.90	5.71	----	Mar.	----	5.64	5.84	6.22	Mar.	5.27	5.49	5.75	6.32	Mar.	----	----	----	----
Apr.	5.80	5.29	5.57	5.78	6.25	5.87	5.71	----	Apr.	----	5.62	5.81	6.19	Apr.	5.29	5.50	5.74	6.32	Apr.	----	----	----	----
May	5.52	4.96	5.25	5.49	6.05	5.59	5.44	----	May	----	5.29	5.50	5.97	May	4.96	5.19	5.47	6.13	May	----	----	----	----
June	5.52	4.88	5.16	5.44	6.23	5.62	5.42	----	June	----	5.22	5.46	6.18	June	4.88	5.11	5.42	6.28	June	----	----	----	----
July	5.32	4.72	4.96	5.25	6.01	5.41	5.23	----	July	----	4.99	5.26	5.98	July	4.72	4.92	5.23	6.04	July	----	----	----	----
Aug.	5.05	4.49	4.72	5.00	5.66	5.10	4.98	----	Aug.	----	4.75	5.01	5.55	Aug.	4.49	4.68	4.98	5.77	Aug.	----	----	----	----
Sept.	5.05	4.53	4.72	5.01	5.66	5.10	5.00	----	Sept.	----	4.74	5.01	5.53	Sept.	4.53	4.70	5.00	5.78	Sept.	----	----	----	----
Oct.	5.15	4.68	4.83	5.09	5.72	5.20	5.08	----	Oct.	----	4.89	5.10	5.62	Oct.	4.68	4.77	5.07	5.81	Oct.	----	----	----	----
Nov.	5.37	4.87	5.07	5.33	5.92	5.45	5.29	----	Nov.	----	5.12	5.37	5.85	Nov.	4.87	5.02	5.29	5.99	Nov.	----	----	----	----
Dec.	5.55	5.02	5.26	5.52	6.10	5.64	5.46	----	Dec.	----	5.32	5.56	6.04	Dec.	5.02	5.19	5.47	6.15	Dec.	----	----	----	----
2011																								
Jan.	5.56	5.04	5.26	5.53	6.09	5.64	5.46	----	Jan.	----	5.29	5.57	6.06	Jan.	5.04	5.22	5.48	6.11	Jan.	----	----	----	----
Feb.	5.66	5.22	5.37	5.64	6.15	5.73	5.58	----	Feb.	----	5.42	5.68	6.10	Feb.	5.22	5.31	5.59	6.19	Feb.	----	----	----	----
Mar.	5.55	5.13	5.28	5.52	6.03	5.62	5.48	----	Mar.	----	5.33	5.56	5.97	Mar.	5.13	5.22	5.48	6.09	Mar.	----	----	----	----
Apr.	5.56	5.16	5.29	5.52	6.02	5.62	5.49	----	Apr.	----	5.32	5.55	5.98	Apr.	5.16	5.25	5.48	6.06	Apr.	----	----	----	----
May	5.33	4.96	5.06	5.29	5.78	5.38	5.27	----	May	----	5.08	5.32	5.74	May	4.96	5.04	5.26	5.81	May	----	----	----	----
June	5.30	4.99	5.04	5.26	5.75	5.33	5.27	----	June	----	5.04	5.26	5.67	June	4.99	5.02	5.25	5.82	June	----	----	----	----
July	5.30	4.93	5.03	5.26	5.76	5.34	5.25	----	July	----	5.05	5.27	5.70	July	4.93	4.99	5.25	5.81	July	----	----	----	----
Aug.	4.79	4.37	4.47	4.74	5.36	4.78	4.79	----	Aug.	----	4.44	4.69	5.22	Aug.	4.37	4.50	4.79	5.49	Aug.	----	----	----	----
Sept.	4.60	4.09	4.23	4.54	5.27	4.61	4.58	----	Sept.	----	4.24	4.48	5.11	Sept.	4.09	4.21	4.59	5.42	Sept.	----	----	----	----
Oct.	4.60	3.98	4.16	4.54	5.37	4.66	4.54	----	Oct.	----	4.21	4.52	5.24	Oct.	3.98	4.11	4.56	5.50	Oct.	----	----	----	----
Nov.	4.39	3.87	3.97	4.34	5.14	4.37	4.41	----	Nov.	----	3.92	4.25	4.93	Nov.	3.87	4.01	4.43	5.34	Nov.	----	----	----	----
Dec.	4.47	3.93	4.03	4.40	5.25	4.47	4.47	----	Dec.	----	4.00	4.33	5.07	Dec.	3.93	4.06	4.46	5.43	Dec.	----	----	----	----
2012																								
Jan.	4.45	3.85	4.01	4.39	5.23	4.48	4.41	----	Jan.	----	4.03	4.34	5.06	Jan.	3.85	3.98	4.43	5.39	Jan.	----	----	----	----
Feb.	4.42	3.85	3.99	4.39	5.14	4.47	4.37	----	Feb.	----	4.02	4.36	5.02	Feb.	3.85	3.96	4.41	5.26	Feb.	----	----	----	----
Mar.	4.54	3.99	4.14	4.51	5.23	4.59	4.50	----	Mar.	----	4.16	4.48	5.13	Mar.	3.99	4.12	4.53	5.33	Mar.	----	----	----	----
Apr.	4.49	3.96	4.08	4.44	5.19	4.53	4.44	----	Apr.	----	4.10	4.40	5.11	Apr.	3.96	4.06	4.48	5.27	Apr.	----	----	----	----
May	4.33	3.80	3.91	4.26	5.07	4.36	4.30	----	May	----	3.92	4.20	4.97	May	3.80	3.90	4.32	5.17	May	----	----	----	----
June	4.22	3.64	3.78	4.14	5.02	4.26	4.18	----	June	----	3.79	4.08	4.91	June	3.64	3.77	4.18	5.13	June	----	----	----	----
July	4.03	3.40	3.54	3.93	4.87	4.12	3.93	----	July	----	3.58	3.93	4.85	July	3.40	3.49	3.93	4.89	July	----	----	----	----
Aug.	4.09	3.48	3.61	3.99	4.91	4.18	3.99	----	Aug.	----	3.65	4.00	4.88	Aug.	3.48	3.57	3.98	4.93	Aug.	----	----	----	----
Sept.	4.09	3.49	3.68	4.01	4.84	4.17	4.00	----	Sept.	----	3.69	4.02	4.81	Sept.	3.49	3.66	4.00	4.87	Sept.	----	----	----	----
Oct.	3.97	3.47	3.63	3.90	4.58	4.05	3.89	----	Oct.	----	3.68	3.91	4.54	Oct.	3.47	3.58	3.89	4.62	Oct.	----	----	----	----
Nov.	3.92	3.50	3.57	3.87	4.51	3.95	3.88	----	Nov.	----	3.60	3.84	4.42	Nov.	3.50	3.54	3.89	4.60	Nov.	----	----	----	----
Dec.	4.05	3.65	3.70	3.98	4.63	4.10	3.99	----	Dec.	----	3.75	4.00	4.56	Dec.	3.65	3.65	3.96	4.70	Dec.	----	----	----	----
2013																								
Jan.	4.19	3.80	3.87	4.14	4.73	4.24	4.14	----	Jan.	----	3.90	4.15	4.66	Jan.	3.80	3.84	4.13	4.81	Jan.	----	----	----	----
Feb.	4.27	3.90	3.95	4.19	4.85	4.29	4.25	----	Feb.	----	3.95	4.18	4.74	Feb.	3.90	3.95	4.20	4.95	Feb.	----	----	----	----
Mar.	4.29	3.93	3.97	4.23	4.85	4.29	4.29	----	Mar.	----	3.95	4.20	4.72	Mar.	3.93	3.98	4.25	4.99	Mar.	----	----	----	----
Apr.	4.07	3.73	3.77	4.03	4.59	4.08	4.07	----	Apr.	----	3.74	4.00	4.49	Apr.	3.73	3.79	4.05	4.69	Apr.	----	----	----	----
May	4.23	3.89	3.94	4.19	4.73	4.24	4.22	----	May	----	3.91	4.17	4.65	May	3.89	3.97	4.20	4.80	May	----	----	----	----
June	4.63	4.27	4.32	4.56	5.19	4.63	4.63	----	June	----	4.27	4.53	5.08	June	4.27	4.36	4.58	5.29	June	----	----	----	----
July	4.76	4.34	4.46	4.69	5.32	4.78	4.74	----	July	----	4.44	4.68	5.21	July	4.34	4.47	4.69	5.43	July	----	----	----	----
Aug.	4.88	4.54	4.63	4.78	5.42	4.85	4.92	----	Aug.	----	4.53	4.73	5.28	Aug.	4.54	4.72	4.83	5.57	Aug.	----	----	----	----
Sept.	4.95	4.64	4.69	4.85	5.47	4.90	4.99	----	Sept.	----	4.58	4.80	5.31	Sept.	4.64	4.80	4.90	5.62	Sept.	----	----	----	----
Oct.	4.82	4.53	4.59	4.73	5.31	4.78	4.86	----	Oct.	----	4.48	4.70	5.17	Oct.	4.53	4.69	4.76	5.44	Oct.	----	----	----	----
Nov.	4.91	4.63	4.67	4.82	5.38	4.86	4.95	----	Nov.	----	4.56	4.77	5.24	Nov.	4.63	4.79	4.85	5.52	Nov.	----	----	----	----
Dec.	4.92	4.62	4.68	4.85	5.38	4.89	4.95	----	Dec.	----	4.59	4.81	5.25	Dec.	4.62	4.76	4.89	5.51	Dec.	----	----	----	----
2014																								
Jan.	4.76	4.49	4.53	4.69	5.19	4.72	4.78	----	Jan.	----	4.44	4.63	5.09	Jan.	4.49	4.62	4.74	5.29	Jan.	----	----	----	----
Feb.	4.68	4.45	4.46	4.60	5.10	4.64	4.71	----	Feb.	----	4.38	4.53	5.01	Feb.	4.45	4.54	4.66	5.19	Feb.	----	----	----	----
Mar.	4.65	4.38	4.44	4.56	5.06	4.63	4.65	----	Mar.	----	4.40	4.51	5.00	Mar.	4.38	4.49	4.60	5.13	Mar.	----	----	----	----
Apr.	4.52	4.24	4.33	4.45	4.90	4.52	4.51	----	Apr.	----	4.30	4.41	4.85	Apr.	4.24	4.36	4.48	4.96	Apr.	----	----	----	----
May	4.38	4.16	4.20	4.31	4.76	4.37	4.40	----	May	----	4.16	4.26	4.69	May	4.16	4.24	4.35	4.83	May	----	----	----	----
June	4.44	4.25	4.26	4.35	4.80	4.42	4.45	----	June	----	4.23	4.29	4.73	June	4.25	4.29	4.41	4.86	June	----	----	----	----
July	4.37	4.16	4.20	4.28	4.73	4.35	4.39	----	July	----	4.16	4.23	4.66	July	4.16	4.23	4.34	4.80	July	----	----	----	----
Aug.	4.29	4.08	4.10	4.20	4.69	4.29	4.30	----	Aug.	----	4.07	4.13	4.65	Aug.	4.08	4.13	4.26	4.72	Aug.	----	----	----	----
Sept.	4.39	4.11	4.19	4.30	4.80	4.40	4.37	----	Sept.	----	4.18	4.24	4.79	Sept.	4.11	4.19	4.35	4.82	Sept.	----	----	----	----
Oct.	4.22	3.92	3.99	4.13	4.69	4.24	4.20	----	Oct.	----	3.98	4.06	4.67	Oct.	3.92	4.00	4.20	4.70	Oct.	----	----	----	----
Nov.	4.28	3.92	4.04	4.18	4.79	4.29	4.26	----	Nov.	----	4.03	4.09	4.75	Nov.	3.92	4.04	4.27	4.82	Nov.	----	----	----	----
Dec.	4.17	3.79	3.89	4.05	4.74	4.18	4.15	----	Dec.	----	3.90	3.95	4.70	Dec.	3.79	3.89	4.15	4.77					
2015																								
Jan.	3.84	3.46	3.54	3.70	4.45	3.83	3.84	----	Jan.	----	3.52	3.58	4.39	Jan.	3.46	3.55	3.82	4.51	Jan.	----	----	----	----
Feb.	3.93	3.61	3.64	3.81	4.51	3.91	3.94	----	Feb.	----	3.62	3.67	4.44	Feb.	3.61	3.65	3.94	4.57	Feb.	----	----	----	----
Mar.	3.98	3.64	3.70	3.85	4.54	3.97	3.97	----	Mar.	----	3.67	3.74	4.51	Mar.	3.64	3.72	3.96	4.56	Mar.	----	----	----	----
Apr.	3.93	3.52	3.64	3.82	4.48	3.96	3.88	----	Apr.	----	3.63	3.75	4.51	Apr.	3.52	3.65	3.89	4.45	Apr.	----	----	----	----
May	4.35	3.98	4.07	4.24	4.89	4.38	4.31	----	May	----	4.05	4.17	4.91	May	3.98	4.09	4.30	4.86	May	----	----	----	----
June	4.56	4.19	4.27	4.45	5.13	4.60	4.52	----	June	----	4.29	4.39	5.13	June	4.19	4.25	4.51	5.12	June	----	----	----	----
July	4.57	4.15	4.25	4.44	5.20	4.63	4.51	----	July	----	4.27	4.40	5.22	July	4.15	4.22	4.49	5.18	July	----	----	----	----
Aug.	4.48	4.04	4.13	4.32	5.19	4.54	4.42	----	Aug.	----	4.13	4.25	5.23	Aug.	4.04	4.11	4.39	5.15	Aug.	----	----	----	----
Sept.	4.59	4.07	4.21	4.43	5.34	4.68	4.49	----	Sept.	----	4.25	4.39	5.42	Sept.	4.07	4.16	4.46	5.25	Sept.	----	----	----	----
Oct.	4.52	3.95	4.11	4.33	5.34	4.63	4.40	----	Oct.	----	4.13	4.29	5.47	Oct.	3.95	4.08	4.37	5.21	Oct.	----	----	----	----
Nov.	4.62	4.06	4.21	4.43	5.46	4.73	4.51	----	Nov.	----	4.22	4.40	5.57	Nov.	4.06	4.20	4.45	5.34	Nov.	----	----	----	----
Dec.	4.58	3.97	4.16	4.38	5.46	4.69	4.47	----	Dec.	----	4.16	4.35	5.55	Dec.	3.97	4.16	4.40	5.36	Dec.	----	----	----	----
2016																								
Jan.	4.56	4.00	4.12	4.35	5.45	4.62	4.50	----	Jan.	----	4.09	4.27	5.49	Jan.	4.00	4.16	4.42	5.40	Jan.	----	----	----	----
Feb.	4.44	3.96	3.98	4.22	5.34	4.44	4.43	----	Feb.	----	3.94	4.11	5.28	Feb.	3.96	4.02	4.33	5.39	Feb.	----	----	----	----
Mar.	4.33	3.82	3.91	4.16	5.13	4.40	4.25	----	Mar.	----	3.93	4.16	5.12	Mar.	3.82	3.89	4.16	5.14	Mar.	----	----	----	----
Apr.	4.09	3.62	3.71	3.98	4.79	4.16	4.01	----	Apr.	----	3.74	4.00	4.75	Apr.	3.62	3.67	3.95	4.82	Apr.	----	----	----	----
May	4.04	3.65	3.70	3.94	4.68	4.06	4.02	----	May	----	3.65	3.93	4.60	May	3.65	3.73	3.95	4.75	May	----	----	----	----
June	3.91	3.50	3.60	3.80	4.53	3.93	3.88	----	June	----	3.56	3.78	4.47	June	3.50	3.63	3.82	4.58	June	----	----	----	----
July	3.67	3.28	3.39	3.58	4.22	3.70	3.64	----	July	----	3.36	3.57	4.16	July	3.28	3.42	3.58	4.27	July	----	----	----	----
Aug.	3.70	3.32	3.42	3.60	4.24	3.73	3.66	----	Aug.	----	3.39	3.59	4.20	Aug.	3.32	3.45	3.61	4.27	Aug.	----	----	----	----
Sept.	3.78	3.41	3.50	3.68	4.31	3.80	3.75	----	Sept.	----	3.47	3.66	4.27	Sept.	3.41	3.53	3.69	4.35	Sept.	----	----	----	----
Oct.	3.87	3.51	3.61	3.78	4.38	3.90	3.84	----	Oct.	----	3.59	3.77	4.34	Oct.	3.51	3.63	3.79	4.40	Oct.	----	----	----	----
Nov.	4.20	3.86	3.94	4.11	4.71	4.21	4.19	----	Nov.	----	3.91	4.08	4.64	Nov.	3.86	3.97	4.14	4.77	Nov.	----	----	----	----
Dec.	4.36	4.06	4.12	4.28	4.83	4.39	4.33	----	Dec.	----	4.11	4.27	4.79	Dec.	4.06	4.13	4.29	4.85	Dec.	----	----	----	----
2017																								
Jan.	4.22	3.92	3.98	4.16	4.66	4.24	4.20	----	Jan.	----	3.96	4.14	4.62	Jan.	3.92	4.00	4.17	4.70	Jan.	----	----	----	----

Notes: Moody's® Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly-replenished population of nearly 75 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possible to 30 years; they are dropped from the list if their remaining life falls below 20 years, if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of Aaa -rated railroad term bond issues, Moody's® Aaa railroad bond yield average was discontinued as of December 18, 1967. Moody's® Aaa public utility average suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.

Because of the dearth of Aaa rated public utility bond issues, Moody's Aaa public utility bond yield average was discontinued as of December 10, 2001.

KWalton

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Corporate Bond Yield Averages

	AV.	Corporate by Ratings				Corporate by Groups				Public Utility Bonds					Industrial Bonds					Railroad Bonds			
	CORP.	Aaa	Aa	A	Baa	P.U.	IND.	R.R.		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa
2009																								
Feb.	6.64	5.27	6.02	6.47	8.08	6.72	6.56	----	Feb.	----	6.11	6.30	7.74	Feb.	5.27	5.93	6.62	8.42	Feb.	----	----	----	----
Mar.	6.84	5.50	6.11	6.66	8.42	6.85	6.83	----	Mar.	----	6.14	6.42	8.00	Mar.	5.50	6.07	6.90	8.84	Mar.	----	----	----	----
Apr.	6.85	5.39	6.17	6.70	8.39	6.90	6.79	----	Apr.	----	6.20	6.48	8.03	Apr.	5.39	6.14	6.90	8.74	Apr.	----	----	----	----
May	6.79	5.54	6.24	6.67	8.06	6.83	6.75	----	May	----	6.23	6.49	7.76	May	5.54	6.24	6.84	8.36	May	----	----	----	----
June	6.52	5.61	6.12	6.39	7.50	6.54	6.49	----	June	----	6.13	6.20	7.30	June	5.61	6.11	6.58	7.69	June	----	----	----	----
July	6.17	5.41	5.71	6.09	7.09	6.15	6.18	----	July	----	5.63	5.97	6.87	July	5.41	5.78	6.20	7.30	July	----	----	----	----
Aug.	5.83	5.26	5.45	5.78	6.58	5.80	5.86	----	Aug.	----	5.33	5.71	6.36	Aug.	5.26	5.56	5.84	6.79	Aug.	----	----	----	----
Sept.	5.61	5.13	5.21	5.56	6.31	5.60	5.62	----	Sept.	----	5.15	5.53	6.12	Sept.	5.13	5.27	5.58	6.50	Sept.	----	----	----	----
Oct.	5.63	5.15	5.24	5.57	6.29	5.64	5.61	----	Oct.	----	5.23	5.55	6.14	Oct.	5.15	5.25	5.59	6.44	Oct.	----	----	----	----
Nov.	5.68	5.19	5.29	5.64	6.32	5.71	5.64	----	Nov.	----	5.33	5.64	6.18	Nov.	5.19	5.26	5.64	6.46	Nov.	----	----	----	----
Dec.	5.78	5.26	5.44	5.77	6.37	5.86	5.71	----	Dec.	----	5.52	5.79	6.26	Dec.	5.26	5.36	5.74	6.47	Dec.	----	----	----	----
2010																								
Jan.	5.76	5.26	5.50	5.76	6.25	5.83	5.69	----	Jan.	----	5.55	5.77	6.16	Jan.	5.26	5.44	5.73	6.33	Jan.	----	----	----	----
Feb.	5.86	5.35	5.62	5.84	6.34	5.94	5.79	----	Feb.	----	5.69	5.87	6.25	Feb.	5.35	5.55	5.80	6.43	Feb.	----	----	----	----
Mar.	5.81	5.27	5.57	5.80	6.27	5.90	5.71	----	Mar.	----	5.64	5.84	6.22	Mar.	5.27	5.49	5.75	6.32	Mar.	----	----	----	----
Apr.	5.80	5.29	5.57	5.78	6.25	5.87	5.71	----	Apr.	----	5.62	5.81	6.19	Apr.	5.29	5.50	5.74	6.32	Apr.	----	----	----	----
May	5.52	4.96	5.25	5.49	6.05	5.59	5.44	----	May	----	5.29	5.50	5.97	May	4.96	5.19	5.47	6.13	May	----	----	----	----
June	5.52	4.88	5.16	5.44	6.23	5.62	5.42	----	June	----	5.22	5.46	6.18	June	4.88	5.11	5.42	6.28	June	----	----	----	----
July	5.32	4.72	4.96	5.25	6.01	5.41	5.23	----	July	----	4.99	5.26	5.98	July	4.72	4.92	5.23	6.04	July	----	----	----	----
Aug.	5.05	4.49	4.72	5.00	5.66	5.10	4.98	----	Aug.	----	4.75	5.01	5.55	Aug.	4.49	4.68	4.98	5.77	Aug.	----	----	----	----
Sept.	5.05	4.53	4.72	5.01	5.66	5.10	5.00	----	Sept.	----	4.74	5.01	5.53	Sept.	4.53	4.70	5.00	5.78	Sept.	----	----	----	----
Oct.	5.15	4.68	4.83	5.09	5.72	5.20	5.08	----	Oct.	----	4.89	5.10	5.62	Oct.	4.68	4.77	5.07	5.81	Oct.	----	----	----	----
Nov.	5.37	4.87	5.07	5.33	5.92	5.45	5.29	----	Nov.	----	5.12	5.37	5.85	Nov.	4.87	5.02	5.29	5.99	Nov.	----	----	----	----
Dec.	5.55	5.02	5.26	5.52	6.10	5.64	5.46	----	Dec.	----	5.32	5.56	6.04	Dec.	5.02	5.19	5.47	6.15	Dec.	----	----	----	----
2011																								
Jan.	5.56	5.04	5.26	5.53	6.09	5.64	5.46	----	Jan.	----	5.29	5.57	6.06	Jan.	5.04	5.22	5.48	6.11	Jan.	----	----	----	----
Feb.	5.66	5.22	5.37	5.64	6.15	5.73	5.58	----	Feb.	----	5.42	5.68	6.10	Feb.	5.22	5.31	5.59	6.19	Feb.	----	----	----	----
Mar.	5.55	5.13	5.28	5.52	6.03	5.62	5.48	----	Mar.	----	5.33	5.56	5.97	Mar.	5.13	5.22	5.48	6.09	Mar.	----	----	----	----
Apr.	5.56	5.16	5.29	5.52	6.02	5.62	5.49	----	Apr.	----	5.32	5.55	5.98	Apr.	5.16	5.25	5.48	6.06	Apr.	----	----	----	----
May	5.33	4.96	5.06	5.29	5.78	5.38	5.27	----	May	----	5.08	5.32	5.74	May	4.96	5.04	5.26	5.81	May	----	----	----	----
June	5.30	4.99	5.04	5.26	5.75	5.33	5.27	----	June	----	5.04	5.26	5.67	June	4.99	5.02	5.25	5.82	June	----	----	----	----
July	5.30	4.93	5.03	5.26	5.76	5.34	5.25	----	July	----	5.05	5.27	5.70	July	4.93	4.99	5.25	5.81	July	----	----	----	----
Aug.	4.79	4.37	4.47	4.74	5.36	4.78	4.79	----	Aug.	----	4.44	4.69	5.22	Aug.	4.37	4.50	4.79	5.49	Aug.	----	----	----	----
Sept.	4.60	4.09	4.23	4.54	5.27	4.61	4.58	----	Sept.	----	4.24	4.48	5.11	Sept.	4.09	4.21	4.59	5.42	Sept.	----	----	----	----
Oct.	4.60	3.98	4.16	4.54	5.37	4.66	4.54	----	Oct.	----	4.21	4.52	5.24	Oct.	3.98	4.11	4.56	5.50	Oct.	----	----	----	----
Nov.	4.39	3.87	3.97	4.34	5.14	4.37	4.41	----	Nov.	----	3.92	4.25	4.93	Nov.	3.87	4.01	4.43	5.34	Nov.	----	----	----	----
Dec.	4.47	3.93	4.03	4.40	5.25	4.47	4.47	----	Dec.	----	4.00	4.33	5.07	Dec.	3.93	4.06	4.46	5.43	Dec.	----	----	----	----
2012																								
Jan.	4.45	3.85	4.01	4.39	5.23	4.48	4.41	----	Jan.	----	4.03	4.34	5.06	Jan.	3.85	3.98	4.43	5.39	Jan.	----	----	----	----
Feb.	4.42	3.85	3.99	4.39	5.14	4.47	4.37	----	Feb.	----	4.02	4.36	5.02	Feb.	3.85	3.96	4.41	5.26	Feb.	----	----	----	----
Mar.	4.54	3.99	4.14	4.51	5.23	4.59	4.50	----	Mar.	----	4.16	4.48	5.13	Mar.	3.99	4.12	4.53	5.33	Mar.	----	----	----	----
Apr.	4.49	3.96	4.08	4.44	5.19	4.53	4.44	----	Apr.	----	4.10	4.40	5.11	Apr.	3.96	4.06	4.48	5.27	Apr.	----	----	----	----
May	4.33	3.80	3.91	4.26	5.07	4.36	4.30	----	May	----	3.92	4.20	4.97	May	3.80	3.90	4.32	5.17	May	----	----	----	----
June	4.22	3.64	3.78	4.14	5.02	4.26	4.18	----	June	----	3.79	4.08	4.91	June	3.64	3.77	4.18	5.13	June	----	----	----	----
July	4.03	3.40	3.54	3.93	4.87	4.12	3.93	----	July	----	3.58	3.93	4.85	July	3.40	3.49	3.93	4.89	July	----	----	----	----
Aug.	4.09	3.48	3.61	3.99	4.91	4.18	3.99	----	Aug.	----	3.65	4.00	4.88	Aug.	3.48	3.57	3.98	4.93	Aug.	----	----	----	----
Sept.	4.09	3.49	3.68	4.01	4.84	4.17	4.00	----	Sept.	----	3.69	4.02	4.81	Sept.	3.49	3.66	4.00	4.87	Sept.	----	----	----	----
Oct.	3.97	3.47	3.63	3.90	4.58	4.05	3.89	----	Oct.	----	3.68	3.91	4.54	Oct.	3.47	3.58	3.89	4.62	Oct.	----	----	----	----
Nov.	3.92	3.50	3.57	3.87	4.51	3.95	3.88	----	Nov.	----	3.60	3.84	4.42	Nov.	3.50	3.54	3.89	4.60	Nov.	----	----	----	----
Dec.	4.05	3.65	3.70	3.98	4.63	4.10	3.99	----	Dec.	----	3.75	4.00	4.56	Dec.	3.65	3.65	3.96	4.70	Dec.	----	----	----	----
2013																								
Jan.	4.19	3.80	3.87	4.14	4.73	4.24	4.14	----	Jan.	----	3.90	4.15	4.66	Jan.	3.80	3.84	4.13	4.81	Jan.	----	----	----	----
Feb.	4.27	3.90	3.95	4.19	4.85	4.29	4.25	----	Feb.	----	3.95	4.18	4.74	Feb.	3.90	3.95	4.20	4.95	Feb.	----	----	----	----
Mar.	4.29	3.93	3.97	4.23	4.85	4.29	4.29	----	Mar.	----	3.95	4.20	4.72	Mar.	3.93	3.98	4.25	4.99	Mar.	----	----	----	----
Apr.	4.07	3.73	3.77	4.03	4.59	4.08	4.07	----	Apr.	----	3.74	4.00	4.49	Apr.	3.73	3.79	4.05	4.69	Apr.	----	----	----	----
May	4.23	3.89	3.94	4.19	4.73	4.24	4.22	----	May	----	3.91	4.17	4.65	May	3.89	3.97	4.20	4.80	May	----	----	----	----
June	4.63	4.27	4.32	4.56	5.19	4.63	4.63	----	June	----	4.27	4.53	5.08	June	4.27	4.36	4.58	5.29	June	----	----	----	----
July	4.76	4.34	4.46	4.69	5.32	4.78	4.74	----	July	----	4.44	4.68	5.21	July	4.34	4.47	4.69	5.43	July	----	----	----	----
Aug.	4.88	4.54	4.63	4.78	5.42	4.85	4.92	----	Aug.	----	4.53	4.73	5.28	Aug.	4.54	4.72	4.83	5.57	Aug.	----	----	----	----
Sept.	4.95	4.64	4.69	4.85	5.47	4.90	4.99	----	Sept.	----	4.58	4.80	5.31	Sept.	4.64	4.80	4.90	5.62	Sept.	----	----	----	----
Oct.	4.82	4.53	4.59	4.73	5.31	4.78	4.86	----	Oct.	----	4.48	4.70	5.17	Oct.	4.53	4.69	4.76	5.44	Oct.	----	----	----	----
Nov.	4.91	4.63	4.67	4.82	5.38	4.86	4.95	----	Nov.	----	4.56	4.77	5.24	Nov.	4.63	4.79	4.85	5.52	Nov.	----	----	----	----
Dec.	4.92	4.62	4.68	4.85	5.38	4.89	4.95	----	Dec.	----	4.59	4.81	5.25	Dec.	4.62	4.76	4.89	5.51	Dec.	----	----	----	----
2014																								
Jan.	4.76	4.49	4.53	4.69	5.19	4.72	4.78	----	Jan.	----	4.44	4.63	5.09	Jan.	4.49	4.62	4.74	5.29	Jan.	----	----	----	----
Feb.	4.68	4.45	4.46	4.60	5.10	4.64	4.71	----	Feb.	----	4.38	4.53	5.01	Feb.	4.45	4.54	4.66	5.19	Feb.	----	----	----	----
Mar.	4.65	4.38	4.44	4.56	5.06	4.63	4.65	----	Mar.	----	4.40	4.51	5.00	Mar.	4.38	4.49	4.60	5.13	Mar.	----	----	----	----
Apr.	4.52	4.24	4.33	4.45	4.90	4.52	4.51	----	Apr.	----	4.30	4.41	4.85	Apr.	4.24	4.36	4.48	4.96	Apr.	----	----	----	----
May	4.38	4.16	4.20	4.31	4.76	4.37	4.40	----	May	----	4.16	4.26	4.69	May	4.16	4.24	4.35	4.83	May	----	----	----	----
June	4.44	4.25	4.26	4.35	4.80	4.42	4.45	----	June	----	4.23	4.29	4.73	June	4.25	4.29	4.41	4.86	June	----	----	----	----
July	4.37	4.16	4.20	4.28	4.73	4.35	4.39	----	July	----	4.16	4.23	4.66	July	4.16	4.23	4.34	4.80	July	----	----	----	----
Aug.	4.29	4.08	4.10	4.20	4.69	4.29	4.30	----	Aug.	----	4.07	4.13	4.65	Aug.	4.08	4.13	4.26	4.72	Aug.	----	----	----	----

Notes: Moody's® Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly-replenished population of nearly 75 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possible to 30 years; they are dropped from the list if their remaining life falls below 20 years, if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of **Aaa** -rated railroad term bond issues, Moody's® **Aaa** railroad bond yield average was discontinued as of December 18, 1967. Moody's® **Aaa** public utility average suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.

Because of the dearth of Aaa rated public utility bond issues, Moody's Aaa public utility bond yield average was discontinued as of December 10, 2001.

KWalton

Corporate Bond Yield Averages \(January 2015\).pdf
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Corporate Bond Yield Averages

	AV.	CORPORATE BY RATINGS				CORPORATE BY GROUPS				PUBLIC UTILITY BONDS					INDUSTRIAL BONDS					RAILROAD BONDS			
	CORP.	Aaa	Aa	A	Baa	P.U.	IND.	R.R.		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa
2009																							
Feb.	6.64	5.27	6.02	6.47	8.08	6.72	6.56	----	Feb.	----	6.11	6.30	7.74	Feb.	5.27	5.93	6.62	8.42	Feb.	----	----	----	----
Mar.	6.84	5.50	6.11	6.66	8.42	6.85	6.83	----	Mar.	----	6.14	6.42	8.00	Mar.	5.50	6.07	6.90	8.84	Mar.	----	----	----	----
Apr.	6.85	5.39	6.17	6.70	8.39	6.90	6.79	----	Apr.	----	6.20	6.48	8.03	Apr.	5.39	6.14	6.90	8.74	Apr.	----	----	----	----
May	6.79	5.54	6.24	6.67	8.06	6.83	6.75	----	May	----	6.23	6.49	7.76	May	5.54	6.24	6.84	8.36	May	----	----	----	----
June	6.52	5.61	6.12	6.39	7.50	6.54	6.49	----	June	----	6.13	6.20	7.30	June	5.61	6.11	6.58	7.69	June	----	----	----	----
July	6.17	5.41	5.71	6.09	7.09	6.15	6.18	----	July	----	5.63	5.97	6.87	July	5.41	5.78	6.20	7.30	July	----	----	----	----
Aug.	5.83	5.26	5.45	5.78	6.58	5.80	5.86	----	Aug.	----	5.33	5.71	6.36	Aug.	5.26	5.56	5.84	6.79	Aug.	----	----	----	----
Sept.	5.61	5.13	5.21	5.56	6.31	5.60	5.62	----	Sept.	----	5.15	5.53	6.12	Sept.	5.13	5.27	5.58	6.50	Sept.	----	----	----	----
Oct.	5.63	5.15	5.24	5.57	6.29	5.64	5.61	----	Oct.	----	5.23	5.55	6.14	Oct.	5.15	5.25	5.59	6.44	Oct.	----	----	----	----
Nov.	5.68	5.19	5.29	5.64	6.32	5.71	5.64	----	Nov.	----	5.33	5.64	6.18	Nov.	5.19	5.26	5.64	6.46	Nov.	----	----	----	----
Dec.	5.78	5.26	5.44	5.77	6.37	5.86	5.71	----	Dec.	----	5.52	5.79	6.26	Dec.	5.26	5.36	5.74	6.47	Dec.	----	----	----	----
2010																							
Jan.	5.76	5.26	5.50	5.76	6.25	5.83	5.69	----	Jan.	----	5.55	5.77	6.16	Jan.	5.26	5.44	5.73	6.33	Jan.	----	----	----	----
Feb.	5.86	5.35	5.62	5.84	6.34	5.94	5.79	----	Feb.	----	5.69	5.87	6.25	Feb.	5.35	5.55	5.80	6.43	Feb.	----	----	----	----
Mar.	5.81	5.27	5.57	5.80	6.27	5.90	5.71	----	Mar.	----	5.64	5.84	6.22	Mar.	5.27	5.49	5.75	6.32	Mar.	----	----	----	----
Apr.	5.80	5.29	5.57	5.78	6.25	5.87	5.71	----	Apr.	----	5.62	5.81	6.19	Apr.	5.29	5.50	5.74	6.32	Apr.	----	----	----	----
May	5.52	4.96	5.25	5.49	6.05	5.59	5.44	----	May	----	5.29	5.50	5.97	May	4.96	5.19	5.47	6.13	May	----	----	----	----
June	5.52	4.88	5.16	5.44	6.23	5.62	5.42	----	June	----	5.22	5.46	6.18	June	4.88	5.11	5.42	6.28	June	----	----	----	----
July	5.32	4.72	4.96	5.25	6.01	5.41	5.23	----	July	----	4.99	5.26	5.98	July	4.72	4.92	5.23	6.04	July	----	----	----	----
Aug.	5.05	4.49	4.72	5.00	5.66	5.10	4.98	----	Aug.	----	4.75	5.01	5.55	Aug.	4.49	4.68	4.98	5.77	Aug.	----	----	----	----
Sept.	5.05	4.53	4.72	5.01	5.66	5.10	5.00	----	Sept.	----	4.74	5.01	5.53	Sept.	4.53	4.70	5.00	5.78	Sept.	----	----	----	----
Oct.	5.15	4.68	4.83	5.09	5.72	5.20	5.08	----	Oct.	----	4.89	5.10	5.62	Oct.	4.68	4.77	5.07	5.81	Oct.	----	----	----	----
Nov.	5.37	4.87	5.07	5.33	5.92	5.45	5.29	----	Nov.	----	5.12	5.37	5.85	Nov.	4.87	5.02	5.29	5.99	Nov.	----	----	----	----
Dec.	5.55	5.02	5.26	5.52	6.10	5.64	5.46	----	Dec.	----	5.32	5.56	6.04	Dec.	5.02	5.19	5.47	6.15	Dec.	----	----	----	----
2011																							
Jan.	5.56	5.04	5.26	5.53	6.09	5.64	5.46	----	Jan.	----	5.29	5.57	6.06	Jan.	5.04	5.22	5.48	6.11	Jan.	----	----	----	----
Feb.	5.66	5.22	5.37	5.64	6.15	5.73	5.58	----	Feb.	----	5.42	5.68	6.10	Feb.	5.22	5.31	5.59	6.19	Feb.	----	----	----	----
Mar.	5.55	5.13	5.28	5.52	6.03	5.62	5.48	----	Mar.	----	5.33	5.56	5.97	Mar.	5.13	5.22	5.48	6.09	Mar.	----	----	----	----
Apr.	5.56	5.16	5.29	5.52	6.02	5.62	5.49	----	Apr.	----	5.32	5.55	5.98	Apr.	5.16	5.25	5.48	6.06	Apr.	----	----	----	----
May	5.33	4.96	5.06	5.29	5.78	5.38	5.27	----	May	----	5.08	5.32	5.74	May	4.96	5.04	5.26	5.81	May	----	----	----	----
June	5.30	4.99	5.04	5.26	5.75	5.33	5.27	----	June	----	5.04	5.26	5.67	June	4.99	5.02	5.25	5.82	June	----	----	----	----
July	5.30	4.93	5.03	5.26	5.76	5.34	5.25	----	July	----	5.05	5.27	5.70	July	4.93	4.99	5.25	5.81	July	----	----	----	----
Aug.	4.79	4.37	4.47	4.74	5.36	4.78	4.79	----	Aug.	----	4.44	4.69	5.22	Aug.	4.37	4.50	4.79	5.49	Aug.	----	----	----	----
Sept.	4.60	4.09	4.23	4.54	5.27	4.61	4.58	----	Sept.	----	4.24	4.48	5.11	Sept.	4.09	4.21	4.59	5.42	Sept.	----	----	----	----
Oct.	4.60	3.98	4.16	4.54	5.37	4.66	4.54	----	Oct.	----	4.21	4.52	5.24	Oct.	3.98	4.11	4.56	5.50	Oct.	----	----	----	----
Nov.	4.39	3.87	3.97	4.34	5.14	4.37	4.41	----	Nov.	----	3.92	4.25	4.93	Nov.	3.87	4.01	4.43	5.34	Nov.	----	----	----	----
Dec.	4.47	3.93	4.03	4.40	5.25	4.47	4.47	----	Dec.	----	4.00	4.33	5.07	Dec.	3.93	4.06	4.46	5.43	Dec.	----	----	----	----
2012																							
Jan.	4.45	3.85	4.01	4.39	5.23	4.48	4.41	----	Jan.	----	4.03	4.34	5.06	Jan.	3.85	3.98	4.43	5.39	Jan.	----	----	----	----
Feb.	4.42	3.85	3.99	4.39	5.14	4.47	4.37	----	Feb.	----	4.02	4.36	5.02	Feb.	3.85	3.96	4.41	5.26	Feb.	----	----	----	----
Mar.	4.54	3.99	4.14	4.51	5.23	4.59	4.50	----	Mar.	----	4.16	4.48	5.13	Mar.	3.99	4.12	4.53	5.33	Mar.	----	----	----	----
Apr.	4.49	3.96	4.08	4.44	5.19	4.53	4.44	----	Apr.	----	4.10	4.40	5.11	Apr.	3.96	4.06	4.48	5.27	Apr.	----	----	----	----
May	4.33	3.80	3.91	4.26	5.07	4.36	4.30	----	May	----	3.92	4.20	4.97	May	3.80	3.90	4.32	5.17	May	----	----	----	----
June	4.22	3.64	3.78	4.14	5.02	4.26	4.18	----	June	----	3.79	4.08	4.91	June	3.64	3.77	4.18	5.13	June	----	----	----	----
July	4.03	3.40	3.54	3.93	4.87	4.12	3.93	----	July	----	3.58	3.93	4.85	July	3.40	3.49	3.93	4.89	July	----	----	----	----
Aug.	4.09	3.48	3.61	3.99	4.91	4.18	3.99	----	Aug.	----	3.65	4.00	4.88	Aug.	3.48	3.57	3.98	4.93	Aug.	----	----	----	----
Sept.	4.09	3.49	3.68	4.01	4.84	4.17	4.00	----	Sept.	----	3.69	4.02	4.81	Sept.	3.49	3.66	4.00	4.87	Sept.	----	----	----	----
Oct.	3.97	3.47	3.63	3.90	4.58	4.05	3.89	----	Oct.	----	3.68	3.91	4.54	Oct.	3.47	3.58	3.89	4.62	Oct.	----	----	----	----
Nov.	3.92	3.50	3.57	3.87	4.51	3.95	3.88	----	Nov.	----	3.60	3.84	4.42	Nov.	3.50	3.54	3.89	4.60	Nov.	----	----	----	----
Dec.	4.05	3.65	3.70	3.98	4.63	4.10	3.99	----	Dec.	----	3.75	4.00	4.56	Dec.	3.65	3.65	3.96	4.70	Dec.	----	----	----	----
2013																							
Jan.	4.19	3.80	3.87	4.14	4.73	4.24	4.14	----	Jan.	----	3.90	4.15	4.66	Jan.	3.80	3.84	4.13	4.81	Jan.	----	----	----	----
Feb.	4.27	3.90	3.95	4.19	4.85	4.29	4.25	----	Feb.	----	3.95	4.18	4.74	Feb.	3.90	3.95	4.20	4.95	Feb.	----	----	----	----
Mar.	4.29	3.93	3.97	4.23	4.85	4.29	4.29	----	Mar.	----	3.95	4.20	4.72	Mar.	3.93	3.98	4.25	4.99	Mar.	----	----	----	----
Apr.	4.07	3.73	3.77	4.03	4.59	4.08	4.07	----	Apr.	----	3.74	4.00	4.49	Apr.	3.73	3.79	4.05	4.69	Apr.	----	----	----	----
May	4.23	3.89	3.94	4.19	4.73	4.24	4.22	----	May	----	3.91	4.17	4.65	May	3.89	3.97	4.20	4.80	May	----	----	----	----
June	4.63	4.27	4.32	4.56	5.19	4.63	4.63	----	June	----	4.27	4.53	5.08	June	4.27	4.36	4.58	5.29	June	----	----	----	----
July	4.76	4.34	4.46	4.69	5.32	4.78	4.74	----	July	----	4.44	4.68	5.21	July	4.34	4.47	4.69	5.43	July	----	----	----	----
Aug.	4.88	4.54	4.63	4.78	5.42	4.85	4.92	----	Aug.	----	4.53	4.73	5.28	Aug.	4.54	4.72	4.83	5.57	Aug.	----	----	----	----
Sept.	4.95	4.64	4.69	4.85	5.47	4.90	4.99	----	Sept.	----	4.58	4.80	5.31	Sept.	4.64	4.80	4.90	5.62	Sept.	----	----	----	----
Oct.	4.82	4.53	4.59	4.73	5.31	4.78	4.86	----	Oct.	----	4.48	4.70	5.17	Oct.	4.53	4.69	4.76	5.44	Oct.	----	----	----	----
Nov.	4.91	4.63	4.67	4.82	5.38	4.86	4.95	----	Nov.	----	4.56	4.77	5.24	Nov.	4.63	4.79	4.85	5.52	Nov.	----	----	----	----
Dec.	4.92	4.62	4.68	4.85	5.38	4.89	4.95	----	Dec.	----	4.59	4.81	5.25	Dec.	4.62	4.76	4.89	5.51	Dec.	----	----	----	----
2014																							
Jan.	4.76	4.49	4.53	4.69	5.19	4.72	4.78	----	Jan.	----	4.44	4.63	5.09	Jan.	4.49	4.62	4.74	5.29	Jan.	----	----	----	----
Feb.	4.68	4.45	4.46	4.60	5.10	4.64	4.71	----	Feb.	----	4.38	4.53	5.01	Feb.	4.45	4.54	4.66	5.19	Feb.	----	----	----	----
Mar.	4.65	4.38	4.44	4.56	5.06	4.63	4.65	----	Mar.	----	4.40	4.51	5.00	Mar.	4.38	4.49	4.60	5.13	Mar.	----	----	----	----
Apr.	4.52	4.24	4.33	4.45	4.90	4.52	4.51	----	Apr.	----	4.30	4.41	4.85	Apr.	4.24	4.36	4.48	4.96	Apr.	----	----	----	----
May	4.38	4.16	4.20	4.31	4.76	4.37	4.40	----	May	----	4.16	4.26	4.69	May	4.16	4.24	4.35	4.83	May	----	----	----	----
June	4.44	4.25	4.26	4.35	4.80	4.42	4.45	----	June	----	4.23	4.29	4.73	June	4.25	4.29	4.41	4.86	June	----	----	----	----
July	4.37	4.16	4.20	4.28	4.73	4.35	4.39	----	July	----	4.16	4.23	4.66	July	4.16	4.23	4.34	4.80	July	----	----	----	----
Aug.	4.29	4.08	4.10	4.20	4.69	4.29	4.30	----	Aug.	----	4.07	4.13	4.65	Aug.	4.08	4.13	4.26	4.72	Aug.	----	----	----	----
Sept.	4.39	4.11	4.19	4.30	4.80	4.40	4.37	----	Sept.	----	4.18	4.24	4.79	Sept.	4.11	4.19	4.35	4.82	Sept.	----	----	----	----
Oct.	4.22	3.92	3.99	4.13	4.69	4.24	4.20	----	Oct.	----	3.98	4.06	4.67	Oct.	3.92	4.00	4.20	4.70	Oct.	----	----	----	----
Nov.	4.28	3.92	4.04	4.18	4.79	4.29	4.26	----	Nov.	----	4.03	4.09	4.75	Nov.	3.92	4.04	4.27	4.82	Nov.	----	----	----	----
Dec.	4.17	3.79	3.89	4.05	4.74	4.18	4.15	----	Dec.	----	3.90	3.95	4.70	Dec.	3.79	3.89	4.15	4.77	Dec.	----	----	----	----

Notes: Moody's® Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly-replenished population of nearly 75 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possible to 30 years; they are dropped from the list if their remaining life falls below 20 years, if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of **Aaa** -rated railroad term bond issues, Moody's® **Aaa** railroad bond yield average was discontinued as of December 18, 1967. Moody's® **Aaa** public utility average suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.

Because of the dearth of Aaa rated public utility bond issues, Moody's Aaa public utility bond yield average was discontinued as of December 10, 2001.

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Corporate Bond Yield from 2017 July Bond Record.pdf
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Corporate Bond Yield Averages

	AV.	CORPORATE BY RATINGS				CORPORATE BY GROUPS			PUBLIC UTILITY BONDS				INDUSTRIAL BONDS				RAILROAD BONDS			
	CORP.	Aaa	Aa	A	Baa	P.U.	IND.	R.R.	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa
2011																				
Jan.	5.56	5.04	5.26	5.53	6.09	5.64	5.46	----	----	5.29	5.57	6.06	5.04	5.22	5.48	6.11	----	----	----	----
Feb.	5.66	5.22	5.37	5.64	6.15	5.73	5.58	----	----	5.42	5.68	6.10	5.22	5.31	5.59	6.19	----	----	----	----
Mar.	5.55	5.13	5.28	5.52	6.03	5.62	5.48	----	----	5.33	5.56	5.97	5.13	5.22	5.48	6.09	----	----	----	----
Apr.	5.56	5.16	5.29	5.52	6.02	5.62	5.49	----	----	5.32	5.55	5.98	5.16	5.25	5.48	6.06	----	----	----	----
May	5.33	4.96	5.06	5.29	5.78	5.38	5.27	----	----	5.08	5.32	5.74	4.96	5.04	5.26	5.81	----	----	----	----
June	5.30	4.99	5.04	5.26	5.75	5.33	5.27	----	----	5.04	5.26	5.67	4.99	5.02	5.25	5.82	----	----	----	----
July	5.30	4.93	5.03	5.26	5.76	5.34	5.25	----	----	5.05	5.27	5.70	4.93	4.99	5.25	5.81	----	----	----	----
Aug.	4.79	4.37	4.47	4.74	5.36	4.78	4.79	----	----	4.44	4.69	5.22	4.37	4.50	4.79	5.49	----	----	----	----
Sept.	4.60	4.09	4.23	4.54	5.27	4.61	4.58	----	----	4.24	4.48	5.11	4.09	4.21	4.59	5.42	----	----	----	----
Oct.	4.60	3.98	4.16	4.54	5.37	4.66	4.54	----	----	4.21	4.52	5.24	3.98	4.11	4.56	5.50	----	----	----	----
Nov.	4.39	3.87	3.97	4.34	5.14	4.37	4.41	----	----	3.92	4.25	4.93	3.87	4.01	4.43	5.34	----	----	----	----
Dec.	4.47	3.93	4.03	4.40	5.25	4.47	4.47	----	----	4.00	4.33	5.07	3.93	4.06	4.46	5.43	----	----	----	----
2012																				
Jan.	4.45	3.85	4.01	4.39	5.23	4.48	4.41	----	----	4.03	4.34	5.06	3.85	3.98	4.43	5.39	----	----	----	----
Feb.	4.42	3.85	3.99	4.39	5.14	4.47	4.37	----	----	4.02	4.36	5.02	3.85	3.96	4.41	5.26	----	----	----	----
Mar.	4.54	3.99	4.14	4.51	5.23	4.59	4.50	----	----	4.16	4.48	5.13	3.99	4.12	4.53	5.33	----	----	----	----
Apr.	4.49	3.96	4.08	4.44	5.19	4.53	4.44	----	----	4.10	4.40	5.11	3.96	4.06	4.48	5.27	----	----	----	----
May	4.33	3.80	3.91	4.26	5.07	4.36	4.30	----	----	3.92	4.20	4.97	3.80	3.90	4.32	5.17	----	----	----	----
June	4.22	3.64	3.78	4.14	5.02	4.26	4.18	----	----	3.79	4.08	4.91	3.64	3.77	4.18	5.13	----	----	----	----
July	4.03	3.40	3.54	3.93	4.87	4.12	3.93	----	----	3.58	3.93	4.85	3.40	3.49	3.93	4.89	----	----	----	----
Aug.	4.09	3.48	3.61	3.99	4.91	4.18	3.99	----	----	3.65	4.00	4.88	3.48	3.57	3.98	4.93	----	----	----	----
Sept.	4.09	3.49	3.68	4.01	4.84	4.17	4.00	----	----	3.69	4.02	4.81	3.49	3.66	4.00	4.87	----	----	----	----
Oct.	3.97	3.47	3.63	3.90	4.58	4.05	3.89	----	----	3.68	3.91	4.54	3.47	3.58	3.89	4.62	----	----	----	----
Nov.	3.92	3.50	3.57	3.87	4.51	3.95	3.88	----	----	3.60	3.84	4.42	3.50	3.54	3.89	4.60	----	----	----	----
Dec.	4.05	3.65	3.70	3.98	4.63	4.10	3.99	----	----	3.75	4.00	4.56	3.65	3.65	3.96	4.70	----	----	----	----
2013																				
Jan.	4.19	3.80	3.87	4.14	4.73	4.24	4.14	----	----	3.90	4.15	4.66	3.80	3.84	4.13	4.81	----	----	----	----
Feb.	4.27	3.90	3.95	4.19	4.85	4.29	4.25	----	----	3.95	4.18	4.74	3.90	3.95	4.20	4.95	----	----	----	----
Mar.	4.29	3.93	3.97	4.23	4.85	4.29	4.29	----	----	3.95	4.20	4.72	3.93	3.98	4.25	4.99	----	----	----	----
Apr.	4.07	3.73	3.77	4.03	4.59	4.08	4.07	----	----	3.74	4.00	4.49	3.73	3.79	4.05	4.69	----	----	----	----
May	4.23	3.89	3.94	4.19	4.73	4.24	4.22	----	----	3.91	4.17	4.65	3.89	3.97	4.20	4.80	----	----	----	----
June	4.63	4.27	4.32	4.56	5.19	4.63	4.63	----	----	4.27	4.53	5.08	4.27	4.36	4.58	5.29	----	----	----	----
July	4.76	4.34	4.46	4.69	5.32	4.78	4.74	----	----	4.44	4.68	5.21	4.34	4.47	4.69	5.43	----	----	----	----
Aug.	4.88	4.54	4.63	4.78	5.42	4.85	4.92	----	----	4.53	4.73	5.28	4.54	4.72	4.83	5.57	----	----	----	----
Sept.	4.95	4.64	4.69	4.85	5.47	4.90	4.99	----	----	4.58	4.80	5.31	4.64	4.80	4.90	5.62	----	----	----	----
Oct.	4.82	4.53	4.59	4.73	5.31	4.78	4.86	----	----	4.48	4.70	5.17	4.53	4.69	4.76	5.44	----	----	----	----
Nov.	4.91	4.63	4.67	4.82	5.38	4.86	4.95	----	----	4.56	4.77	5.24	4.63	4.79	4.85	5.52	----	----	----	----
Dec.	4.92	4.62	4.68	4.85	5.38	4.89	4.95	----	----	4.59	4.81	5.25	4.62	4.76	4.89	5.51	----	----	----	----
2014																				
Jan.	4.76	4.49	4.53	4.69	5.19	4.72	4.78	----	----	4.44	4.63	5.09	4.49	4.62	4.74	5.29	----	----	----	----
Feb.	4.68	4.45	4.46	4.60	5.10	4.64	4.71	----	----	4.38	4.53	5.01	4.45	4.54	4.66	5.19	----	----	----	----
Mar.	4.65	4.38	4.44	4.56	5.06	4.63	4.65	----	----	4.40	4.51	5.00	4.38	4.49	4.60	5.13	----	----	----	----
Apr.	4.52	4.24	4.33	4.45	4.90	4.52	4.51	----	----	4.30	4.41	4.85	4.24	4.36	4.48	4.96	----	----	----	----
May	4.38	4.16	4.20	4.31	4.76	4.37	4.40	----	----	4.16	4.26	4.69	4.16	4.24	4.35	4.83	----	----	----	----
June	4.44	4.25	4.26	4.35	4.80	4.42	4.45	----	----	4.23	4.29	4.73	4.25	4.29	4.41	4.86	----	----	----	----
July	4.37	4.16	4.20	4.28	4.73	4.35	4.39	----	----	4.16	4.23	4.66	4.16	4.23	4.34	4.80	----	----	----	----
Aug.	4.29	4.08	4.10	4.20	4.69	4.29	4.30	----	----	4.07	4.13	4.65	4.08	4.13	4.26	4.72	----	----	----	----
Sept.	4.39	4.11	4.19	4.30	4.80	4.40	4.37	----	----	4.18	4.24	4.79	4.11	4.19	4.35	4.82	----	----	----	----
Oct.	4.22	3.92	3.99	4.13	4.69	4.24	4.20	----	----	3.98	4.06	4.67	3.92	4.00	4.20	4.70	----	----	----	----
Nov.	4.28	3.92	4.04	4.18	4.79	4.29	4.26	----	----	4.03	4.09	4.75	3.92	4.04	4.27	4.82	----	----	----	----
Dec.	4.17	3.79	3.89	4.05	4.74	4.18	4.15	----	----	3.90	3.95	4.70	3.79	3.89	4.15	4.77				
2015																				
Jan.	3.84	3.46	3.54	3.70	4.45	3.83	3.84	----	----	3.52	3.58	4.39	3.46	3.55	3.82	4.51	----	----	----	----
Feb.	3.93	3.61	3.64	3.81	4.51	3.91	3.94	----	----	3.62	3.67	4.44	3.61	3.65	3.94	4.57	----	----	----	----
Mar.	3.98	3.64	3.70	3.85	4.54	3.97	3.97	----	----	3.67	3.74	4.51	3.64	3.72	3.96	4.56	----	----	----	----
Apr.	3.93	3.52	3.64	3.82	4.48	3.96	3.88	----	----	3.63	3.75	4.51	3.52	3.65	3.89	4.45	----	----	----	----
May	4.35	3.98	4.07	4.24	4.89	4.38	4.31	----	----	4.05	4.17	4.91	3.98	4.09	4.30	4.86	----	----	----	----
June	4.56	4.19	4.27	4.45	5.13	4.60	4.52	----	----	4.29	4.39	5.13	4.19	4.25	4.51	5.12	----	----	----	----
July	4.57	4.15	4.25	4.44	5.20	4.63	4.51	----	----	4.27	4.40	5.22	4.15	4.22	4.49	5.18	----	----	----	----
Aug.	4.48	4.04	4.13	4.32	5.19	4.54	4.42	----	----	4.13	4.25	5.23	4.04	4.11	4.39	5.15	----	----	----	----
Sept.	4.59	4.07	4.21	4.43	5.34	4.68	4.49	----	----	4.25	4.39	5.42	4.07	4.16	4.46	5.25	----	----	----	----
Oct.	4.52	3.95	4.11	4.33	5.34	4.63	4.40	----	----	4.13	4.29	5.47	3.95	4.08	4.37	5.21	----	----	----	----
Nov.	4.62	4.06	4.21	4.43	5.46	4.73	4.51	----	----	4.22	4.40	5.57	4.06	4.20	4.45	5.34	----	----	----	----
Dec.	4.58	3.97	4.16	4.38	5.46	4.69	4.47	----	----	4.16	4.35	5.55	3.97	4.16	4.40	5.36	----	----	----	----
2016																				
Jan.	4.56	4.00	4.12	4.35	5.45	4.62	4.50	----	----	4.09	4.27	5.49	4.00	4.16	4.42	5.40	----	----	----	----
Feb.	4.44	3.96	3.98	4.22	5.34	4.44	4.43	----	----	3.94	4.11	5.28	3.96	4.02	4.33	5.39	----	----	----	----
Mar.	4.33	3.82	3.91	4.16	5.13	4.40	4.25	----	----	3.93	4.16	5.12	3.82	3.89	4.16	5.14	----	----	----	----
Apr.	4.09	3.62	3.71	3.98	4.79	4.16	4.01	----	----	3.74	4.00	4.75	3.62	3.67	3.95	4.82	----	----	----	----
May	4.04	3.65	3.70	3.94	4.68	4.06	4.02	----	----	3.65	3.93	4.60	3.65	3.73	3.95	4.75	----	----	----	----
June	3.91	3.50	3.60	3.80	4.53	3.93	3.88	----	----	3.56	3.78	4.47	3.50	3.63	3.82	4.58	----	----	----	----
July	3.67	3.28	3.39	3.58	4.22	3.70	3.64	----	----	3.36	3.57	4.16	3.28	3.42	3.58	4.27	----	----	----	----
Aug.	3.70	3.32	3.42	3.60	4.24	3.73	3.66	----	----	3.39	3.59	4.20	3.32	3.45	3.61	4.27	----	----	----	----
Sept.	3.78	3.41	3.50	3.68	4.31	3.80	3.75	----	----	3.47	3.66	4.27	3.41	3.53	3.69	4.35	----	----	----	----
Oct.	3.87	3.51	3.61	3.78	4.38	3.90	3.84	----	----	3.59	3.77	4.34	3.51	3.63	3.79	4.40	----	----	----	----
Nov.	4.20	3.86	3.94	4.11	4.71	4.21	4.19	----	----	3.91	4.08	4.64	3.86	3.97	4.14	4.77	----	----	----	----
Dec.	4.36	4.06	4.12	4.28	4.83	4.39	4.33	----	----	4.11	4.27	4.79	4.06	4.13	4.29	4.85	----	----	----	----
2017																				
Jan.	4.22	3.92	3.98	4.16	4.66	4.24	4.20	----	----	3.96	4.14	4.62	3.92	4.00	4.17	4.70	----	----	----	----
Feb.	4.23	3.95	4.01	4.18	4.64	4.25	4.21	----	----	3.99	4.18	4.58	3.95	4.02	4.19	4.70	----	----	----	----
Mar.	4.28	4.01	4.06	4.23	4.68	4.30	4.27	----	----	4.04	4.23	4.62	4.01	4.07	4.23	4.74	----	----	----	----
Apr.	4.16	3.87	3.93	4.12	4.57	4.19	4.13	----	----	3.93	4.12	4.51	3.87	3.92	4.11	4.62	----	----	----	----
May	4.15	3.85	3.93	4.11	4.55	4.19	4.12	----	----	3.94	4.12	4.50	3.85	3.92	4.09	4.60	----	----	----	----
June	3.98	3.68	3.78	3.93	4.37	4.01	3.95	----	----	3.77	3.94	4.32	3.68	3.78	3.92	4.41	----	----	----	----

Notes: Moody's® Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly-replenished population of over 100 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possible to 30 years, with an average maturity of 28 years. They are dropped from the list if their remaining life falls below 20 years or if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual compounding basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of Aaa -rated railroad term bond issues, Moody's® Aaa railroad bond yield average was discontinued as of December 18, 1967. Moody's® Aaa public utility average was suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.

Because of the dearth of Aaa rated public utility bond issues, Moody's® Aaa public utility bond yield average was discontinued as of December 10, 2001.

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Credit Trends June 10 2016.pdf
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Daily Bond Yields and Key Indicators

Updated by 11 am ET with data from the previous business day. Data as of 10-Jun-16

Moody's Daily Long-term Corporate Bond Yield Averages

	Utilities	Industrial	Corporate
Aaa	NA	3.48	3.48
Aa	3.52	3.58	3.55
A	3.75	3.80	3.78
Baa	4.44	4.55	4.50
Avg	3.90	3.85	3.88

Moody's Daily Treasury Yield Averages

Short-Term (3-5 yrs)	1.02
Medium-Term (5-10 yrs)	1.39
Long-Term (10+ yrs)	2.14

Moody's Daily Public Utility Common Stock Yield Averages

Price	371.71
Yield	4.07
New Dividend	15.11

Moody's Commodity and Scrap Price Indexes

Spot Commodity Index	5,392.27
Industrial Metals Index	1,474.57

* Moody's "Aaa" Utilities Index was suspended on 12/10/01. Since 2000, TVA was the only issuer left in the index as a decade of deregulation, debt growth, competition, and consolidation eliminated the rest of the Aaa universe.

42,531.0

Moody's Analytics, Inc.

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June 2016 Corporate Bond Yield Averages.pdf
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Corporate Bond Yield Averages

	AV. CORP.	CORPORATE BY RATINGS				CORPORATE BY GROUPS				PUBLIC UTILITY BONDS					INDUSTRIAL BONDS					RAILROAD BONDS			
		Aaa	Aa	A	Baa	P.U.	IND.	R.R.		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa		Aaa	Aa	A	Baa
2010																							
Jan.	5.76	5.26	5.50	5.76	6.25	5.83	5.69	----	Jan.	----	5.55	5.77	6.16	Jan.	5.26	5.44	5.73	6.33	Jan.	----	----	----	----
Feb.	5.86	5.35	5.62	5.84	6.34	5.94	5.79	----	Feb.	----	5.69	5.87	6.25	Feb.	5.35	5.55	5.80	6.43	Feb.	----	----	----	----
Mar.	5.81	5.27	5.57	5.80	6.27	5.90	5.71	----	Mar.	----	5.64	5.84	6.22	Mar.	5.27	5.49	5.75	6.32	Mar.	----	----	----	----
Apr.	5.80	5.29	5.57	5.78	6.25	5.87	5.71	----	Apr.	----	5.62	5.81	6.19	Apr.	5.29	5.50	5.74	6.32	Apr.	----	----	----	----
May	5.52	4.96	5.25	5.49	6.05	5.59	5.44	----	May	----	5.29	5.50	5.97	May	4.96	5.19	5.47	6.13	May	----	----	----	----
June	5.52	4.88	5.16	5.44	6.23	5.62	5.42	----	June	----	5.22	5.46	6.18	June	4.88	5.11	5.42	6.28	June	----	----	----	----
July	5.32	4.72	4.96	5.25	6.01	5.41	5.23	----	July	----	4.99	5.26	5.98	July	4.72	4.92	5.23	6.04	July	----	----	----	----
Aug.	5.05	4.49	4.72	5.00	5.66	5.10	4.98	----	Aug.	----	4.75	5.01	5.55	Aug.	4.49	4.68	4.98	5.77	Aug.	----	----	----	----
Sept.	5.05	4.53	4.72	5.01	5.66	5.10	5.00	----	Sept.	----	4.74	5.01	5.53	Sept.	4.53	4.70	5.00	5.78	Sept.	----	----	----	----
Oct.	5.15	4.68	4.83	5.09	5.72	5.20	5.08	----	Oct.	----	4.89	5.10	5.62	Oct.	4.68	4.77	5.07	5.81	Oct.	----	----	----	----
Nov.	5.37	4.87	5.07	5.33	5.92	5.45	5.29	----	Nov.	----	5.12	5.37	5.85	Nov.	4.87	5.02	5.29	5.99	Nov.	----	----	----	----
Dec.	5.55	5.02	5.26	5.52	6.10	5.64	5.46	----	Dec.	----	5.32	5.56	6.04	Dec.	5.02	5.19	5.47	6.15	Dec.	----	----	----	----
2011																							
Jan.	5.56	5.04	5.26	5.53	6.09	5.64	5.46	----	Jan.	----	5.29	5.57	6.06	Jan.	5.04	5.22	5.48	6.11	Jan.	----	----	----	----
Feb.	5.66	5.22	5.37	5.64	6.15	5.73	5.58	----	Feb.	----	5.42	5.68	6.10	Feb.	5.22	5.31	5.59	6.19	Feb.	----	----	----	----
Mar.	5.55	5.13	5.28	5.52	6.03	5.62	5.48	----	Mar.	----	5.33	5.56	5.97	Mar.	5.13	5.22	5.48	6.09	Mar.	----	----	----	----
Apr.	5.56	5.16	5.29	5.52	6.02	5.62	5.49	----	Apr.	----	5.32	5.55	5.98	Apr.	5.16	5.25	5.48	6.06	Apr.	----	----	----	----
May	5.33	4.96	5.06	5.29	5.78	5.38	5.27	----	May	----	5.08	5.32	5.74	May	4.96	5.04	5.26	5.81	May	----	----	----	----
June	5.30	4.99	5.04	5.26	5.75	5.33	5.27	----	June	----	5.04	5.26	5.67	June	4.99	5.02	5.25	5.82	June	----	----	----	----
July	5.30	4.93	5.03	5.26	5.76	5.34	5.25	----	July	----	5.05	5.27	5.70	July	4.93	4.99	5.25	5.81	July	----	----	----	----
Aug.	4.79	4.37	4.47	4.74	5.36	4.78	4.79	----	Aug.	----	4.44	4.69	5.22	Aug.	4.37	4.50	4.79	5.49	Aug.	----	----	----	----
Sept.	4.60	4.09	4.23	4.54	5.27	4.61	4.58	----	Sept.	----	4.24	4.48	5.11	Sept.	4.09	4.21	4.59	5.42	Sept.	----	----	----	----
Oct.	4.60	3.98	4.16	4.54	5.37	4.66	4.54	----	Oct.	----	4.21	4.52	5.24	Oct.	3.98	4.11	4.56	5.50	Oct.	----	----	----	----
Nov.	4.39	3.87	3.97	4.34	5.14	4.37	4.41	----	Nov.	----	3.92	4.25	4.93	Nov.	3.87	4.01	4.43	5.34	Nov.	----	----	----	----
Dec.	4.47	3.93	4.03	4.40	5.25	4.47	4.47	----	Dec.	----	4.00	4.33	5.07	Dec.	3.93	4.06	4.46	5.43	Dec.	----	----	----	----
2012																							
Jan.	4.45	3.85	4.01	4.39	5.23	4.48	4.41	----	Jan.	----	4.03	4.34	5.06	Jan.	3.85	3.98	4.43	5.39	Jan.	----	----	----	----
Feb.	4.42	3.85	3.99	4.39	5.14	4.47	4.37	----	Feb.	----	4.02	4.36	5.02	Feb.	3.85	3.96	4.41	5.26	Feb.	----	----	----	----
Mar.	4.54	3.99	4.14	4.51	5.23	4.59	4.50	----	Mar.	----	4.16	4.48	5.13	Mar.	3.99	4.12	4.53	5.33	Mar.	----	----	----	----
Apr.	4.49	3.96	4.08	4.44	5.19	4.53	4.44	----	Apr.	----	4.10	4.40	5.11	Apr.	3.96	4.06	4.48	5.27	Apr.	----	----	----	----
May	4.33	3.80	3.91	4.26	5.07	4.36	4.30	----	May	----	3.92	4.20	4.97	May	3.80	3.90	4.32	5.17	May	----	----	----	----
June	4.22	3.64	3.78	4.14	5.02	4.26	4.18	----	June	----	3.79	4.08	4.91	June	3.64	3.77	4.18	5.13	June	----	----	----	----
July	4.03	3.40	3.54	3.93	4.87	4.12	3.93	----	July	----	3.58	3.93	4.85	July	3.40	3.49	3.93	4.89	July	----	----	----	----
Aug.	4.09	3.48	3.61	3.99	4.91	4.18	3.99	----	Aug.	----	3.65	4.00	4.88	Aug.	3.48	3.57	3.98	4.93	Aug.	----	----	----	----
Sept.	4.09	3.49	3.68	4.01	4.84	4.17	4.00	----	Sept.	----	3.69	4.02	4.81	Sept.	3.49	3.66	4.00	4.87	Sept.	----	----	----	----
Oct.	3.97	3.47	3.63	3.90	4.58	4.05	3.89	----	Oct.	----	3.68	3.91	4.54	Oct.	3.47	3.58	3.89	4.62	Oct.	----	----	----	----
Nov.	3.92	3.50	3.57	3.87	4.51	3.95	3.88	----	Nov.	----	3.60	3.84	4.42	Nov.	3.50	3.54	3.89	4.60	Nov.	----	----	----	----
Dec.	4.05	3.65	3.70	3.98	4.63	4.10	3.99	----	Dec.	----	3.75	4.00	4.56	Dec.	3.65	3.65	3.96	4.70	Dec.	----	----	----	----
2013																							
Jan.	4.19	3.80	3.87	4.14	4.73	4.24	4.14	----	Jan.	----	3.90	4.15	4.66	Jan.	3.80	3.84	4.13	4.81	Jan.	----	----	----	----
Feb.	4.27	3.90	3.95	4.19	4.85	4.29	4.25	----	Feb.	----	3.95	4.18	4.74	Feb.	3.90	3.95	4.20	4.95	Feb.	----	----	----	----
Mar.	4.29	3.93	3.97	4.23	4.85	4.29	4.29	----	Mar.	----	3.95	4.20	4.72	Mar.	3.93	3.98	4.25	4.99	Mar.	----	----	----	----
Apr.	4.07	3.73	3.77	4.03	4.59	4.08	4.07	----	Apr.	----	3.74	4.00	4.49	Apr.	3.73	3.79	4.05	4.69	Apr.	----	----	----	----
May	4.23	3.89	3.94	4.19	4.73	4.24	4.22	----	May	----	3.91	4.17	4.65	May	3.89	3.97	4.20	4.80	May	----	----	----	----
June	4.63	4.27	4.32	4.56	5.19	4.63	4.63	----	June	----	4.27	4.53	5.08	June	4.27	4.36	4.58	5.29	June	----	----	----	----
July	4.76	4.34	4.46	4.69	5.32	4.78	4.74	----	July	----	4.44	4.68	5.21	July	4.34	4.47	4.69	5.43	July	----	----	----	----
Aug.	4.88	4.54	4.63	4.78	5.42	4.85	4.92	----	Aug.	----	4.53	4.73	5.28	Aug.	4.54	4.72	4.83	5.57	Aug.	----	----	----	----
Sept.	4.95	4.64	4.69	4.85	5.47	4.90	4.99	----	Sept.	----	4.58	4.80	5.31	Sept.	4.64	4.80	4.90	5.62	Sept.	----	----	----	----
Oct.	4.82	4.53	4.59	4.73	5.31	4.78	4.86	----	Oct.	----	4.48	4.70	5.17	Oct.	4.53	4.69	4.76	5.44	Oct.	----	----	----	----
Nov.	4.91	4.63	4.67	4.82	5.38	4.86	4.95	----	Nov.	----	4.56	4.77	5.24	Nov.	4.63	4.79	4.85	5.52	Nov.	----	----	----	----
Dec.	4.92	4.62	4.68	4.85	5.38	4.89	4.95	----	Dec.	----	4.59	4.81	5.25	Dec.	4.62	4.76	4.89	5.51	Dec.	----	----	----	----
2014																							
Jan.	4.76	4.49	4.53	4.69	5.19	4.72	4.78	----	Jan.	----	4.44	4.63	5.09	Jan.	4.49	4.62	4.74	5.29	Jan.	----	----	----	----
Feb.	4.68	4.45	4.46	4.60	5.10	4.64	4.71	----	Feb.	----	4.38	4.53	5.01	Feb.	4.45	4.54	4.66	5.19	Feb.	----	----	----	----
Mar.	4.65	4.38	4.44	4.56	5.06	4.63	4.65	----	Mar.	----	4.40	4.51	5.00	Mar.	4.38	4.49	4.60	5.13	Mar.	----	----	----	----
Apr.	4.52	4.24	4.33	4.45	4.90	4.52	4.51	----	Apr.	----	4.30	4.41	4.85	Apr.	4.24	4.36	4.48	4.96	Apr.	----	----	----	----
May	4.38	4.16	4.20	4.31	4.76	4.37	4.40	----	May	----	4.16	4.26	4.69	May	4.16	4.24	4.35	4.83	May	----	----	----	----
June	4.44	4.25	4.26	4.35	4.80	4.42	4.45	----	June	----	4.23	4.29	4.73	June	4.25	4.29	4.41	4.86	June	----	----	----	----
July	4.37	4.16	4.20	4.28	4.73	4.35	4.39	----	July	----	4.16	4.23	4.66	July	4.16	4.23	4.34	4.80	July	----	----	----	----
Aug.	4.29	4.08	4.10	4.20	4.69	4.29	4.30	----	Aug.	----	4.07	4.13	4.65	Aug.	4.08	4.13	4.26	4.72	Aug.	----	----	----	----
Sept.	4.39	4.11	4.19	4.30	4.80	4.40	4.37	----	Sept.	----	4.18	4.24	4.79	Sept.	4.11	4.19	4.35	4.82	Sept.	----	----	----	----
Oct.	4.22	3.92	3.99	4.13	4.69	4.24	4.20	----	Oct.	----	3.98	4.06	4.67	Oct.	3.92	4.00	4.20	4.70	Oct.	----	----	----	----
Nov.	4.28	3.92	4.04	4.18	4.79	4.29	4.26	----	Nov.	----	4.03	4.09	4.75	Nov.	3.92	4.04	4.27	4.82	Nov.	----	----	----	----
Dec.	4.17	3.79	3.89	4.05	4.74	4.18	4.15	----	Dec.	----	3.90	3.95	4.70	Dec.	3.79	3.89	4.15	4.77					
2015																							
Jan.	3.84	3.46	3.54	3.70	4.45	3.83	3.84	----	Jan.	----	3.52	3.58	4.39	Jan.	3.46	3.55	3.82	4.51	Jan.	----	----	----	----
Feb.	3.93	3.61	3.64	3.81	4.51	3.91	3.94	----	Feb.	----	3.62	3.67	4.44	Feb.	3.61	3.65	3.94	4.57	Feb.	----	----	----	----
Mar.	3.98	3.64	3.70	3.85	4.54	3.97	3.97	----	Mar.	----	3.67	3.74	4.51	Mar.	3.64	3.72	3.96	4.56	Mar.	----	----	----	----
Apr.	3.93	3.52	3.64	3.82	4.48	3.96	3.88	----	Apr.	----	3.63	3.75	4.51	Apr.	3.52	3.65	3.89	4.45	Apr.	----	----	----	----
May	4.35	3.98	4.07	4.24	4.89	4.38	4.31	----	May	----	4.05	4.17	4.91	May	3.98	4.09	4.30	4.86	May	----	----	----	----
June	4.56	4.19	4.27	4.45	5.13	4.60	4.52	----	June	----	4.29	4.39	5.13	June	4.19	4.25	4.51	5.12	June	----	----	----	----
July	4.57	4.15	4.25	4.44	5.20	4.63	4.51	----	July	----	4.27	4.40	5.22	July	4.15	4.22	4.49	5.18	July	----	----	----	----
Aug.	4.48	4.04	4.13	4.32	5.19	4.54	4.42	----	Aug.	----	4.13	4.25	5.23	Aug.	4.04	4.11	4.39	5.15	Aug.	----	----	----	----
Sept.	4.59	4.07	4.21	4.43	5.34	4.68	4.49	----	Sept.	----	4.25	4.39	5.42	Sept.	4.07	4.16	4.46	5.25	Sept.	----	----	----	----
Oct.	4.52	3.95	4.11	4.33	5.34	4.63	4.40	----	Oct.	----	4.13	4.29	5.47	Oct.	3.95	4.08	4.37	5.21	Oct.	----	----	----	----
Nov.	4.62	4.06	4.21	4.43	5.46	4.73	4.51	----	Nov.	----	4.22	4.40	5.57	Nov.	4.06	4.20	4.45	5.34	Nov.	----	----	----	----
Dec.	4.58	3.97	4.16	4.38	5.46	4.69	4.47	----	Dec.	----	4.16	4.35	5.55	Dec.	3.97	4.16	4.40	5.36	Dec.	----	----	----	----
2016																							
Jan.	4.56	4.00	4.12	4.35	5.45	4.62	4.50	----	Jan.	----	4.09	4.27	5.49	Jan.	4.00	4.16	4.42	5.40	Jan.	----	----	----	----
Feb.	4.44	3.96	3.98	4.22	5.34	4.44	4.43	----	Feb.	----	3.94	4.11	5.28	Feb.	3.96	4.02	4.33	5.39	Feb.	----	----	----	----
Mar.	4.33	3.82	3.91	4.16	5.13	4.40	4.25	----	Mar.	----	3.93	4.16	5.12	Mar.	3.82	3.89	4.16	5.14	Mar.	----	----	----	----
Apr.	4.09	3.62	3.71	3.98	4.79	4.16	4.01	----	Apr.	----	3.74	4.00	4.75	Apr.	3.62	3.67	3.95	4.82	Apr.	----	----	----	----
May	4.04	3.65	3.70	3.94	4.68	4.06	4.02	----	May	----	3.65	3.93	4.60	May	3.65	3.73	3.95	4.75	May	----	----	----	----

Notes: Moody's® Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly-replenished population of nearly 75 seasoned corporate bonds in the US market, each with current outstandings over $100 million. The bonds have maturities as close as possible to 30 years; they are dropped from the list if their remaining life falls below 20 years, if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of Aaa -rated railroad term bond issues, Moody's® Aaa railroad bond yield average was discontinued as of December 18, 1967. Moody's® Aaa public utility average suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradable bonds. The July figures were based on 8 business days.

Because of the dearth of Aaa rated public utility bond issues, Moody's Aaa public utility bond yield average was discontinued as of December 10, 2001.

KWalton

AEE 59.51 -0.96 -1.59 %   Ameren Corporation - Yahoo
10/25/17   12:49 PM

Ameren Corporation (AEE)

NYSE - Nasdaq Real Time Price. Currency in USD

59.51 -0.96 (-1.59%)

As of -. Market open.

Currency in USD

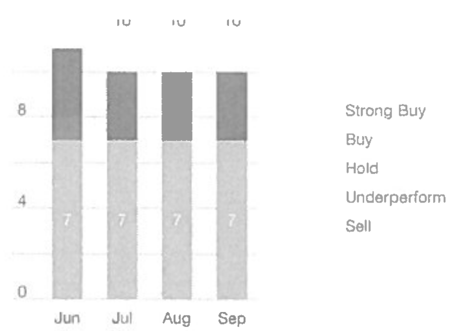
Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	4	3	9	11
Avg. Estimate	1.39	0.2	2.8	3.01

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	1	1	6	7
Avg. Estimate	1.8B	1.39B	6.3B	6.46B
Low Estimate	1.8B	1.39B	6.17B	6.3B
High Estimate	1.8B	1.39B	6.46B	6.65B
Year Ago Sales	1.86B	1.36B	6.08B	6.3B
Sales Growth (year/est)	-3.10%	2.60%	3.80%	2.50%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.38	0.15	0.39	0.7
EPS Actual	1.52	0.13	0.42	0.79
Difference	0.14	-0.02	0.03	0.09
Surprise %	10.10%	-13.30%	7.70%	12.90%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.39	0.2	2.8	3.01
7 Days Ago	1.39	0.2	2.81	3.01

Recommendation Trends ›



Recommendation Rating ›

2.5

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (7) ›

Average 57.89

Current 59.54

Upgrades & Downgrades ›

30 Days Ago	1.4	0.2	2.79	3.01
60 Days Ago	1.5	0.19	2.77	3.01
90 Days Ago	1.5	0.19	2.77	3.01

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	1	N/A
Up Last 30 Days	N/A	N/A	1	N/A
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	AEE	Industry	Sector	S&P 500
Current Qtr.	-8.60%	N/A	N/A	0.20
Next Qtr.	53.80%	N/A	N/A	0.27
Current Year	4.50%	N/A	N/A	0.08
Next Year	7.50%	N/A	N/A	0.11
Next 5 Years (per annum)	6.10%	N/A	N/A	0.10
Past 5 Years (per annum)	0.42%	N/A	N/A	N/A

⇣ Downgrade	Goldman Sachs: to Sell	[illegible]
⇣ Downgrade	Barclays: to Equal-Weight	[illegible]
⇣ Downgrade	Argus Research: to Hold	[illegible]
⇡ +Upgrade	Barclays: to Overweight	[illegible]
⇡ +Upgrade	Goldman Sachs: to Neutral	[illegible]
⇡ +Upgrade	Argus Research: to Buy	[illegible]

KWalton

D 78.25 -1.67 -2.09 % Dominion Energy, Inc. - Yahoo F
10/25/17 12:49 PM

(•) US Markets close in 19 mins

S&P 500	Dow 30	Nasdaq
2,494.20	22,099.04	6,447.33
+6.09 (+0.24%)	+41.67 (+0.19%)	+15.07 (+0.23%)

Dominion Energy, Inc. (D)

NYSE - Nasdaq Real Time Price. Currency in USD

Add to watchlist

Quote Lookup

78.25 -1.67 (-2.09%)

As of 3:41PM EDT. Market open.

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Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	9	8	15	15
Avg. Estimate	1.07	0.91	3.64	4.06
Low Estimate	1.04	0.8	3.54	3.94

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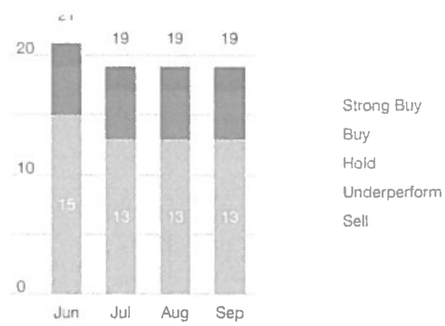
Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	3	3	6	7
Avg. Estimate	3.46B	3.31B	13.06B	14.19B
Low Estimate	3.41B	3.15B	12.45B	13.31B
High Estimate	3.55B	3.55B	14.07B	15.26B
Year Ago Sales	3.13B	3.08B	11.73B	13.06B
Sales Growth (year/est)	10.50%	7.30%	11.30%	8.60%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.07	1	0.96	0.67
EPS Actual	1.14	0.99	0.97	0.67
Difference	0.07	-0.01	0.01	0
Surprise %	6.50%	-1.00%	1.00%	0.00%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.07	0.91	3.64	4.06
7 Days Ago	1.07	0.91	3.64	4.06

Recommendation Trends ›



Recommendation Rating ›

2.6

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (15) ›

Average 80.13

Current 78.24

Upgrades & Downgrades ›

30 Days Ago	1.07	0.91	3.64	4.05
60 Days Ago	1.07	0.92	3.65	4.06
90 Days Ago	1.07	0.93	3.65	4.06

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	1	N/A	1	1
Up Last 30 Days	1	N/A	2	2
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	D	Industry	Sector	S&P 500
Current Qtr.	-6.10%	N/A	N/A	0.20
Next Qtr.	-8.10%	N/A	N/A	0.27
Current Year	-4.20%	N/A	N/A	0.08
Next Year	11.50%	N/A	N/A	0.11
Next 5 Years (per annum)	3.46%	N/A	N/A	0.10
Past 5 Years (per annum)	3.86%	N/A	N/A	N/A

Downgrade	Tudor Pickering: Buy to Hold
Initiated	Credit Suisse: to Outperform
Downgrade	Morgan Stanley: Overweight to Equal-Weight
Downgrade	JP Morgan: Overweight to Neutral
Downgrade	Citigroup: Buy to Neutral
Initiated	Scotia Howard Weil: to Sector Outperform

KWalton

AEP 73.08 -1.47 -1.97 %   American Electric Power Comp
10/25/17   12:49 PM

American Electric Power Company, Inc. (AEP)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

73.08 -1.47 (-1.97%)

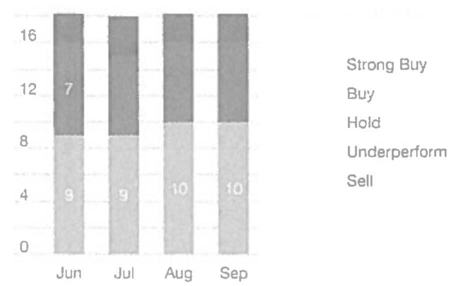
As of 3:37PM EDT. Market open.

People also watch
SO D DUK FE ED

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	10	9	17	18
Avg. Estimate	1.25	0.66	3.65	3.88
Low Estimate	1.04	0.58	3.6	3.83
High Estimate	1.35	0.89	3.7	3.94
Year Ago EPS	1.3	0.67	3.94	3.65

Avg. Estimate	4.45B	3.73B	15.48B	15.88B
Low Estimate	4.17B	3.38B	14.14B	14.36B
High Estimate	4.64B	4.04B	16.38B	17.64B
Year Ago Sales	4.7B	3.8B	16.4B	15.48B
Sales Growth (year/est)	-5.40%	-1.80%	-5.60%	2.60%



Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.22	0.55	0.95	0.82
EPS Actual	1.3	0.67	0.96	0.75
Difference	0.08	0.12	0.01	-0.07
Surprise %	6.60%	21.80%	1.10%	-8.50%

Recommendation Rating ›

2.4

1 Strong Buy, 2 Buy, 3 Hold, 4 Under-perform, 5 Sell

Analyst Price Targets (15) ›

Average 73.00

Current 73.08

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.25	0.66	3.65	3.88
7 Days Ago	1.25	0.66	3.66	3.88

Upgrades & Downgrades ›

30 Days Ago	1.25	0.66	3.66	3.88
60 Days Ago	1.18	0.58	3.66	3.88
90 Days Ago	1.19	0.58	3.66	3.89

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	1	N/A	1
Up Last 30 Days	N/A	1	N/A	1
Down Last 30 Days	1	N/A	1	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	AEP	Industry	Sector	S&P 500
Current Qtr.	-3.80%	N/A	N/A	0.20
Next Qtr.	-1.50%	N/A	N/A	0.27
Current Year	-7.40%	N/A	N/A	0.08
Next Year	6.30%	N/A	N/A	0.11
Next 5 Years (per annum)	2.87%	N/A	N/A	0.10
Past 5 Years (per annum)	2.86%	N/A	N/A	N/A

Downgrade	Goldman Sachs: to Neutral
+Upgrade	Wells Fargo: to Outperform
Downgrade	Evercore ISI Group: to Hold
Downgrade	Jefferies: to Hold
Downgrade	Hilliard Lyons: to Hold
+Upgrade	Goldman Sachs: to Buy

KWalton

SRE 118.24 -1.82 -1.52 % Sempra Energy - Yahoo Fina
10/25/17 12:49 PM

US Markets close in 5 mins

S&P 500	Dow 30	Nasdaq
2,495.16	22,109.63	6,448.81
+7.05 (+0.28%)	+52.26 (+0.24%)	+16.55 (+0.26%)

Sempra Energy (SRE)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

118.24 -1.82 (-1.52%)

As of -. Market open.

People also watch
EIX PCG XEL PEG PNW

Summary | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | **Analysts**

Currency in USD

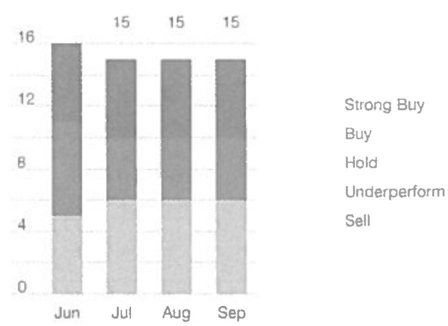
Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	8	8	14	15
Avg. Estimate	1.02	1.42	5.23	5.56
Low Estimate	0.97	1.31	5.12	5.4
High Estimate	1.1	1.55	5.45	5.79
Year Ago EPS	1.02	1.52	5.05	5.23

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	4	4	9	9
Avg. Estimate	2.66B	2.99B	11.08B	11.51B
Low Estimate	2.42B	2.86B	10.54B	10.9B
High Estimate	2.78B	3.08B	11.46B	12.27B
Year Ago Sales	2.54B	2.87B	10.18B	11.08B
Sales Growth (year/est)	5.00%	4.30%	8.80%	3.90%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	0.96	1.49	1.67	0.86
EPS Actual	1.02	1.52	1.74	1.1
Difference	0.06	0.03	0.07	0.24
Surprise %	6.30%	2.00%	4.20%	27.90%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.02	1.42	5.23	5.56
7 Days Ago	1.03	1.41	5.23	5.57

Recommendation Trends ›



Recommendation Rating ›

2

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (11) ›

Average 123.18

Current 118.24

Upgrades & Downgrades ›

30 Days Ago	1.02	1.45	5.19	5.58
60 Days Ago	1.02	1.47	5.1	5.62
90 Days Ago	1.01	1.48	5.1	5.62

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	1	N/A
Up Last 30 Days	N/A	N/A	4	2
Down Last 30 Days	N/A	N/A	N/A	1
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	SRE	Industry	Sector	S&P 500
Current Qtr.	N/A	N/A	N/A	0.20
Next Qtr.	-6.60%	N/A	N/A	0.27
Current Year	3.60%	N/A	N/A	0.08
Next Year	6.30%	N/A	N/A	0.11
Next 5 Years (per annum)	7.80%	N/A	N/A	0.10
Past 5 Years (per annum)	5.54%	N/A	N/A	N/A

⇩ Downgrade	Barclays: to Equal-Weight	[illegible]
⇩ Downgrade	Goldman Sachs: to Neutral	[illegible]
⇧ +Upgrade	Goldman Sachs: to Buy	[illegible]
⇧ +Upgrade	ISI Group: to Buy	[illegible]
⇩ Downgrade	Citigroup: to Neutral	[illegible]
Initiated	KeyBanc: to Buy	[illegible]

KWalton

SO 49.54 -1.07 -2.11 % Southern Company \(The\) - Y
10/25/17 12:49 PM

(•) US Markets close in 4 mins

S&P 500	Dow 30	Nasdaq
2,495.36	22,109.53	6,449.32
+7.25 (+0.29%)	+52.16 (+0.24%)	+17.06 (+0.27%)

The Southern Company (SO)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

49.54 -1.07 (-2.11%)

As of 3:56PM EDT. Market open.

People also watch
DUK AEP ED D EXC

Summary Conversations Statistics Profile Financials Options Holders Historical Data **Analysts**

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	11	9	20	20
Avg. Estimate	1.11	0.44	2.94	3.03
Low Estimate	1.06	0.3	2.84	2.99
High Estimate	1.3	0.56	3	3.12
Year Ago EPS	1.28	0.24	2.89	2.94

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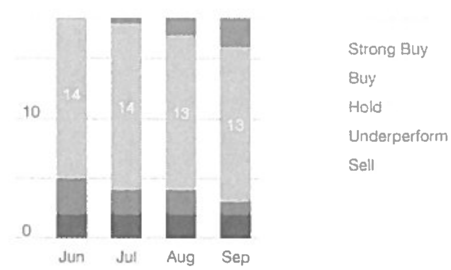
Search Rick 99+

Avg. Estimate	6.23B	5.07B	22.58B	23.33B
Low Estimate	5.91B	4.72B	20.25B	20.77B
High Estimate	6.47B	5.32B	25.31B	26.53B
Year Ago Sales	6.26B	5.18B	19.9B	22.58B
Sales Growth (year/est)	-0.60%	-2.10%	13.50%	3.30%



Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.17	0.33	0.6	0.71
EPS Actual	1.28	0.24	0.66	0.73
Difference	0.11	-0.09	0.06	0.02
Surprise %	9.40%	-27.30%	10.00%	2.80%

Recommendation Rating ›

2.9

1 Strong Buy 2 Buy 3 Hold 4 Under-perform 5 Sell

Analyst Price Targets (16) ›

Average 50.94

Current 49.54

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.11	0.44	2.94	3.03
7 Days Ago	1.11	0.44	2.95	3.03

Upgrades & Downgrades ›

30 Days Ago	1.11	0.46	2.95	3.03
60 Days Ago	1.15	0.43	2.96	3.08
90 Days Ago	1.15	0.43	2.97	3.11

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	1
Up Last 30 Days	N/A	1	N/A	2
Down Last 30 Days	N/A	1	1	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	SO	Industry	Sector	S&P 500
Current Qtr.	-13.30%	N/A	N/A	0.20
Next Qtr.	83.30%	N/A	N/A	0.27
Current Year	1.70%	N/A	N/A	0.08
Next Year	3.10%	N/A	N/A	0.11
Next 5 Years (per annum)	3.22%	N/A	N/A	0.10
Past 5 Years (per annum)	-2.08%	N/A	N/A	N/A

+Upgrade	Deutsche Bank: Hold to Buy
Downgrade	Argus Research: to Hold
+Upgrade	Jefferies: to Buy
Initiated	Credit Suisse: to Underperform
Initiated	Citigroup: to Sell
+Upgrade	Barclays: to Overweight

KWalton

VVC 66.47 -1.64 -2.41 %   Vectren Corporation - Yahoo
10/25/17   12:49 PM

S&P 500	Dow 30	Nasdaq
2,495.50	22,111.90	6,449.78
+7.39 (+0.30%)	+54.53 (+0.25%)	+17.52 (+0.27%)

Vectren Corporation (VVC)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

66.47 -1.64 (-2.41%)

As of -. Market open.

People also watch
WGL NWN BKH PNY UGI

Summary Conversations Statistics Profile Financials Options Holders Historical Data **Analysts**

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	6	5	7	7
Avg. Estimate	0.66	0.85	2.62	2.8
Low Estimate	0.64	0.8	2.6	2.75
High Estimate	0.68	0.88	2.65	2.85
Year Ago EPS	0.74	0.84	2.55	2.62

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	1	1	3	4
Avg. Estimate	639.03M	709.54M	2.6B	2.69B
Low Estimate	639.03M	709.54M	2.58B	2.64B
High Estimate	639.03M	709.54M	2.63B	2.77B
Year Ago Sales	631M	699M	2.45B	2.6B
Sales Growth (year/est)	1.30%	1.50%	6.30%	3.40%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	0.64	0.79	0.65	0.44
EPS Actual	0.74	0.84	0.67	0.45
Difference	0.1	0.05	0.02	0.01
Surprise %	15.60%	6.30%	3.10%	2.30%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	0.66	0.85	2.62	2.8
7 Days Ago	0.66	0.85	2.62	2.8

Recommendation Trends ›

Recommendation Rating ›

2.6

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (5) ›

Average 62.20

Current 66.48

Upgrades & Downgrades ›

Downgrade KeyBanc: to Sector

30 Days Ago	0.65	0.85	2.62	2.8
60 Days Ago	0.65	0.85	2.62	2.8
90 Days Ago	0.65	0.85	2.62	2.8

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	1	1	1	1
Up Last 30 Days	1	1	1	1
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	WC	Industry	Sector	S&P 500
Current Qtr.	-10.80%	N/A	N/A	0.20
Next Qtr.	1.20%	N/A	N/A	0.27
Current Year	2.70%	N/A	N/A	0.08
Next Year	6.90%	N/A	N/A	0.11
Next 5 Years (per annum)	5.50%	N/A	N/A	0.10
Past 5 Years (per annum)	7.37%	N/A	N/A	N/A

	Weight	
+Upgrade	KeyBanc: to Overweight	[illegible]
+Upgrade	Citigroup: to Buy	[illegible]
Initiated	Guggenheim: to Neutral	[illegible]
Downgrade	Brean Capital: to Hold	[illegible]
+Upgrade	KeyBanc: to Buy	[illegible]

KWalton

KWalton

PPL 39.03 -0.80 -2.01 % PPL Corporation - Yahoo Fina
10/25/17 12:49 PM

US Markets close in 7 mins

S&P 500	Dow 30	Nasdaq
2,495.19	22,106.68	6,449.43
+7.08 (+0.28%)	+49.31 (+0.22%)	+17.16 (+0.27%)

PPL Corporation (PPL)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

39.03 -0.80 (-2.01%)

As of -. Market open.

People also watch

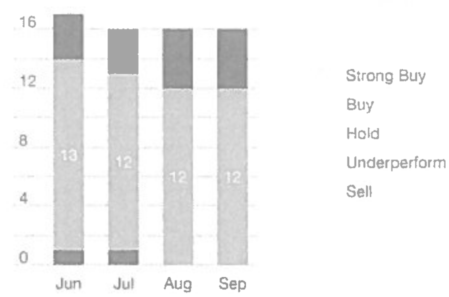
PEG FE AEP EXC ETR

Summary Conversations Statistics Profile Financials Options Holders Historical Data **Analysts**

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	8	7	15	16
Avg. Estimate	0.58	0.45	2.16	2.33
Low Estimate	0.51	0.37	2.13	2.28
High Estimate	0.65	0.5	2.21	2.4
Year Ago EPS	0.63	0.6	2.45	2.16

No. of Analysts	4	4	11	11
Avg. Estimate	2.05B	1.82B	7.6B	8.05B
Low Estimate	1.91B	1.66B	7.14B	7.69B
High Estimate	2.3B	1.88B	8.16B	8.5B
Year Ago Sales	1.89B	1.83B	7.52B	7.6B
Sales Growth (year/est)	8.30%	-0.70%	1.10%	6.00%



Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	0.58	0.5	0.61	0.5
EPS Actual	0.63	0.6	0.62	0.52
Difference	0.05	0.1	0.01	0.02
Surprise %	8.60%	20.00%	1.60%	4.00%

Recommendation Rating

2.5

1 Strong Buy 2 Buy 3 Hold 4 Under-perform 5 Sell

Analyst Price Targets (13)

Average 39.92

Current 39.04

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	0.58	0.45	2.16	2.33
7 Days Ago	0.58	0.45	2.16	2.33

Upgrades & Downgrades

30 Days Ago	0.57	0.44	2.15	2.33
60 Days Ago	0.59	0.48	2.16	2.34
90 Days Ago	0.59	0.48	2.16	2.33

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	N/A
Up Last 30 Days	N/A	N/A	N/A	N/A
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	PPL	Industry	Sector	S&P 500
Current Qtr.	-7.90%	N/A	N/A	0.20
Next Qtr.	-25.00%	N/A	N/A	0.27
Current Year	-11.80%	N/A	N/A	0.08
Next Year	7.90%	N/A	N/A	0.11
Next 5 Years (per annum)	0.04%	N/A	N/A	0.10
Past 5 Years (per annum)	-1.02%	N/A	N/A	N/A

⇡ +Upgrade	Jefferies: to Buy
⇡ +Upgrade	Goldman Sachs: to Neutral
⇣ Downgrade	Goldman Sachs: to Sell
⇣ Downgrade	Bank of America: to Neutral
⇡ +Upgrade	Wolfe Research: to Outperform
⇣ Downgrade	Guggenheim: to Neutral

KWalton

PEG 45.79 -0.95 -2.03 % Public Service Enterprise Grou
10/25/17 12:49 PM

Public Service Enterprise Group Incorporated (PEG)

NYSE - Nasdaq Real Time Price. Currency in USD

45.79 -0.95 (-2.03%)

As of -. Market open.

Currency in USD

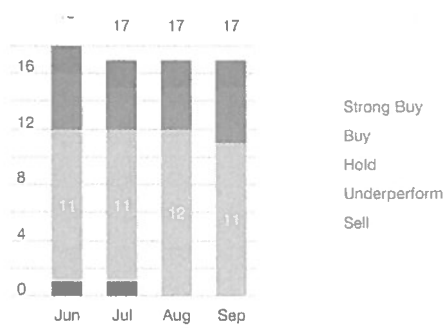
Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	7	7	13	14

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	2	2	8	9
Avg. Estimate	2.54B	2.2B	9.53B	10.12B
Low Estimate	2.33B	1.86B	8.44B	8.82B
High Estimate	2.75B	2.54B	10.89B	11.69B
Year Ago Sales	2.45B	2.09B	9.06B	9.53B
Sales Growth (year/est)	3.70%	5.40%	5.20%	6.10%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	0.83	0.53	0.85	0.58
EPS Actual	0.88	0.54	0.92	0.62
Difference	0.05	0.01	0.07	0.04
Surprise %	6.00%	1.90%	8.20%	6.90%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	0.86	0.54	2.92	2.93
7 Days Ago	0.86	0.54	2.92	2.93

Recommendation Trends >



Recommendation Rating >

2.5

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (15) >

Average 48.35

Current 45.78

Upgrades & Downgrades >

30 Days Ago	0.86	0.54	2.92	2.94
60 Days Ago	0.88	0.54	2.9	2.93
90 Days Ago	0.89	0.54	2.9	2.94

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	N/A
Up Last 30 Days	1	N/A	N/A	N/A
Down Last 30 Days	1	1	1	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	PEG	Industry	Sector	S&P 500
Current Qtr.	-2.30%	N/A	N/A	0.20
Next Qtr.	N/A	N/A	N/A	0.27
Current Year	0.70%	N/A	N/A	0.08
Next Year	0.30%	N/A	N/A	0.11
Next 5 Years (per annum)	0.57%	N/A	N/A	0.10
Past 5 Years (per annum)	5.26%	N/A	N/A	N/A

Upgrades & Downgrades

+Upgrade	Mizuho: Neutral to Buy
Downgrade	Wells Fargo: to Market Perform
+Upgrade	Deutsche Bank: to Buy
+Upgrade	JP Morgan: to Overweight
+Upgrade	Goldman Sachs: to Buy
+Upgrade	Morgan Stanley: to Equal-Weight

KWalton

SCG 59.03 -0.60 -1.01 %   SCANA Corporation - Yahoo I
10/25/17   12:49 PM

(•) US Markets close in 5 mins

S&P 500	Dow 30	Nasdaq
2,495.17	22,107.54	6,449.12
+7.06 (+0.28%)	+50.17 (+0.23%)	+16.86 (+0.26%)

SCANA Corporation (SCG)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

59.03 -0.60 (-1.01%)

As of -. Market open.

People also watch
PNW WEC TE LNT PEG

Summary Conversations Statistics Profile Financials Options Holders Historical Data **Analysts**

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	5	5	7	9
Avg. Estimate	1.15	0.93	4.19	4.25
Low Estimate	0.93	0.63	4	3.55
High Estimate	1.58	1.08	4.28	4.5
Year Ago EPS	1.32	0.87	4.16	4.19

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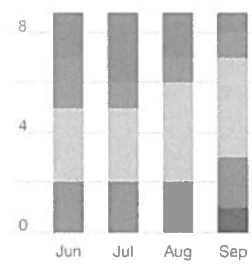
Avg. Estimate	1.15B	1.03B	4.35B	4.45B
Low Estimate	1.08B	933.63M	4.19B	4.27B
High Estimate	1.23B	1.12B	4.61B	4.73B
Year Ago Sales	1.09B	1.06B	4.23B	4.35B
Sales Growth (year/est)	5.60%	-2.70%	3.00%	2.20%



Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.11	0.9	1.31	0.74
EPS Actual	1.32	0.87	1.19	0.85
Difference	0.21	-0.03	-0.12	0.11
Surprise %	18.90%	-3.30%	-9.20%	14.90%

Recommendation Rating ›

2.8

1 Strong Buy · 2 Buy · 3 Hold · 4 Under-perform · 5 Sell

Analyst Price Targets (9) ›

Average 66.17

Current 59.02

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.15	0.93	4.19	4.25
7 Days Ago	1.15	0.93	4.17	4.26

Upgrades & Downgrades ›

30 Days Ago	1.17	0.94	4.12	4.35
60 Days Ago	1.13	1.14	4.19	4.47
90 Days Ago	1.13	1.14	4.2	4.5

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	N/A
Up Last 30 Days	N/A	N/A	N/A	N/A
Down Last 30 Days	N/A	N/A	1	1
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	SCG	Industry	Sector	S&P 500
Current Qtr.	-12.90%	N/A	N/A	0.20
Next Qtr.	6.90%	N/A	N/A	0.27
Current Year	0.70%	N/A	N/A	0.08
Next Year	1.40%	N/A	N/A	0.11
Next 5 Years (per annum)	4.75%	N/A	N/A	0.10
Past 5 Years (per annum)	5.85%	N/A	N/A	N/A

+Upgrade	Mizuho: Underperform to Neutral
+Upgrade	Barclays: Equal-Weight to Overweight
+Upgrade	Goldman Sachs: Sell to Neutral
+Upgrade	UBS: to Buy
Downgrade	Mizuho: to Neutral
Downgrade	Macquarie: to Neutral

KWalton

LNT 42.80 -0.80 -1.83 % Alliant Energy Corporation - Y
10/25/17 12:49 PM

(•) US Markets close in 25 mins

S&P 500	Dow 30	Nasdaq
2,494.31	22,103.94	6,446.88
+6.20 (+0.25%)	+46.57 (+0.21%)	+14.62 (+0.23%)

Alliant Energy Corporation (LNT)

NYSE - Nasdaq Real Time Price. Currency in USD

★ In watchlist

Quote Lookup

42.81 -0.79 (-1.81%)

As of 3:36PM EDT. Market open.

People also watch
WEC WR SCG OGE PNW

Summary Conversations Statistics Profile Financials Options Holders Historical Data **Analysts**

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	4	4	8	10
Avg. Estimate	0.88	0.28	2.01	2.13
Low Estimate	0.85	0.22	2	2.1

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	1	1	3	6
Avg. Estimate	1.51B	459.14M	3.57B	3.62B
Low Estimate	1.51B	459.14M	3.52B	3.52B
High Estimate	1.51B	459.14M	3.59B	3.74B
Year Ago Sales	924.6M	797M	3.32B	3.57B
Sales Growth (year/est)	63.10%	-42.40%	7.50%	1.50%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	0.91	0.28	0.43	0.38
EPS Actual	0.8	0.28	0.44	0.41
Difference	-0.11	0	0.01	0.03
Surprise %	-12.10%	0.00%	2.30%	7.90%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	0.88	0.28	2.01	2.13
7 Days Ago	0.88	0.28	2.01	2.13

Recommendation Trends ›

Recommendation Rating ›

2.3

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (7) ›

Average 42.00

Current 42.83

Upgrades & Downgrades ›

30 Days Ago	0.88	0.28	2.01	2.13
60 Days Ago	0.92	0.28	2	2.13
90 Days Ago	0.92	0.28	2	2.13

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	N/A
Up Last 30 Days	N/A	N/A	N/A	N/A
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	LNT	Industry	Sector	S&P 500
Current Qtr.	10.00%	N/A	N/A	0.20
Next Qtr.	N/A	N/A	N/A	0.27
Current Year	6.90%	N/A	N/A	0.08
Next Year	6.00%	N/A	N/A	0.11
Next 5 Years (per annum)	6.90%	N/A	N/A	0.10
Past 5 Years (per annum)	0.88%	N/A	N/A	N/A

Initiated	Jefferies: to Hold	[illegible]
Initiated	UBS: to Neutral	[illegible]
Downgrade	Macquarie: to Neutral	[illegible]
Initiated	Guggenheim: to Neutral	[illegible]
Downgrade	Barclays: to Equal-Weight	[illegible]
+Upgrade	Barclays: to Overweight	[illegible]

KWalton

NEE 148.79 -2.61 -1.72 % NextEra Energy, Inc. - Yahoo
10/25/17 12:49 PM

US Markets close in 7 mins

S&P 500	Dow 30	Nasdaq
2,495.01	22,107.46	6,448.93
+6.90 (+0.28%)	+50.09 (+0.23%)	+16.66 (+0.26%)

NextEra Energy, Inc. (NEE)

NYSE - Nasdaq Real Time Price. Currency in USD

Add to watchlist

Quote Lookup

148.79 -2.61 (-1.72%)

As of -. Market open.

People also watch
D PPL SO AEP WEC

Summary | Conversations | Statistics | Profile | Financials | Options | Holders | Historical Data | **Analysts**

Currency in USD

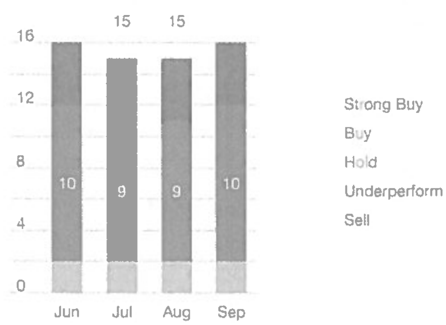
Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	8	8	15	17
Avg. Estimate	1.81	1.36	6.73	7.24
Low Estimate	1.73	1.13	6.57	7.05
High Estimate	1.94	1.5	6.86	7.32
Year Ago EPS	1.74	1.21	6.19	6.73

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	5	5	10	13
Avg. Estimate	4.91B	4.21B	17.44B	18.23B
Low Estimate	4.76B	3.6B	16.82B	17.48B
High Estimate	5.01B	4.48B	18.22B	19.28B
Year Ago Sales	4.8B	3.7B	16.16B	17.44B
Sales Growth (year/est)	2.10%	13.90%	7.90%	4.60%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.68	1.3	1.56	1.76
EPS Actual	1.74	1.21	1.75	1.86
Difference	0.06	-0.09	0.19	0.1
Surprise %	3.60%	-6.90%	12.20%	5.70%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.81	1.36	6.73	7.24
7 Days Ago	1.82	1.36	6.73	7.24

Recommendation Trends >



Recommendation Rating >

1.9

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (14) >

Average 155.57

Current 148.73

Upgrades & Downgrades >

30 Days Ago	1.82	1.36	6.72	7.23
60 Days Ago	1.85	1.41	6.7	7.19
90 Days Ago	1.87	1.42	6.68	7.13

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	2
Up Last 30 Days	N/A	N/A	2	3
Down Last 30 Days	1	N/A	1	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	NEE	Industry	Sector	S&P 500
Current Qtr.	4.00%	N/A	N/A	0.20
Next Qtr.	12.40%	N/A	N/A	0.27
Current Year	8.70%	N/A	N/A	0.08
Next Year	7.60%	N/A	N/A	0.11
Next 5 Years (per annum)	7.34%	N/A	N/A	0.10
Past 5 Years (per annum)	7.58%	N/A	N/A	N/A

+Upgrade	Deutsche Bank: to Buy
Downgrade	Deutsche Bank: to Hold
Downgrade	Macquarie: to Neutral
+Upgrade	Baird: to Outperform
Initiated	Scotia Howard Weil: to Sector Outperform
Initiated	Bernstein: to Outperform

KWalton

ES 62.60 -1.51 -2.35 % Eversource Energy \(DBA\) - Ya
10/25/17 12:49 PM

(•) US Markets close in 15 mins

S&P 500	Dow 30	Nasdaq
2,494.29	22,103.30	6,447.77
+6.18 (+0.25%)	+45.93 (+0.21%)	+15.50 (+0.24%)

Eversource Energy (ES)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

62.60 -1.51 (-2.35%)

As of 3:45PM EDT. Market open.

People also watch
WEC NEE SCG EIX CMS

Summary Conversations Statistics Profile Financials Options Holders Historical Data **Analysts**

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	9	9	14	14
Avg. Estimate	0.86	0.75	3.15	3.32
Low Estimate	0.84	0.64	3.03	3.23
High Estimate	0.89	0.8	3.2	3.43

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	3	3	7	9
Avg. Estimate	2.12B	1.91B	7.79B	8.15B
Low Estimate	2.07B	1.84B	7.68B	7.85B
High Estimate	2.18B	2.01B	7.84B	8.82B
Year Ago Sales	2.04B	1.78B	7.64B	7.79B
Sales Growth (year/est)	4.10%	7.60%	1.90%	4.70%

Recommendation Trends ›

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	0.8	0.74	0.82	0.67
EPS Actual	0.83	0.72	0.82	0.72
Difference	0.03	-0.02	0	0.05
Surprise %	3.70%	-2.70%	0.00%	7.50%

Recommendation Rating ›

2.2

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (12) ›

Average 63.88

Current 62.61

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	0.86	0.75	3.15	3.32
7 Days Ago	0.87	0.76	3.15	3.33

Upgrades & Downgrades ›

30 Days Ago	0.87	0.77	3.15	3.32
60 Days Ago	0.88	0.78	3.15	3.32
90 Days Ago	0.87	0.78	3.15	3.32

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	1	N/A
Up Last 30 Days	N/A	N/A	1	N/A
Down Last 30 Days	1	1	N/A	1
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	ES	Industry	Sector	S&P 500
Current Qtr.	3.60%	N/A	N/A	0.20
Next Qtr.	4.20%	N/A	N/A	0.27
Current Year	6.40%	N/A	N/A	0.08
Next Year	5.40%	N/A	N/A	0.11
Next 5 Years (per annum)	5.81%	N/A	N/A	0.10
Past 5 Years (per annum)	6.26%	N/A	N/A	N/A

Initiated	Credit Suisse: to Neutral	[illegible]
+Upgrade	Deutsche Bank: to Buy	[illegible]
+Upgrade	Janney Capital: to Buy	[illegible]
Downgrade	Janney Capital: to Neutral	[illegible]
Downgrade	Macquarie: to Neutral	[illegible]
Downgrade	Barclays: to Equal-Weight	[illegible]

KWalton

DTE 111.51 -2.01 -1.76 % DTE Energy Company - Yah
10/25/17 12:49 PM

DTE Energy Company (DTE)

NYSE - Nasdaq Real Time Price. Currency in USD

Add to watchlist

Quote Lookup

111.51 -2.01 (-1.76%)

As of -. Market open.

People also watch
CMS ETR FE AEE EIX

Currency in USD

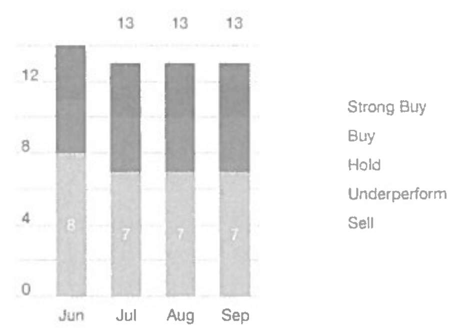
Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	6	5	13	13
Avg. Estimate	1.64	0.94	5.42	5.7
Low Estimate	1.58	0.84	5.29	5.6
High Estimate	1.73	1.03	5.5	5.77
Year Ago EPS	1.96	0.81	5.28	5.42

Revenue Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	2	2	5	7
Avg. Estimate	2.97B	2.37B	10.71B	11.37B
Low Estimate	2.76B	1.77B	9.02B	9.13B
High Estimate	3.18B	2.97B	11.55B	12.97B
Year Ago Sales	2.93B	2.87B	10.63B	10.71B
Sales Growth (year/est)	1.50%	-17.50%	0.80%	6.20%

Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.63	0.86	1.56	1
EPS Actual	1.96	0.81	1.79	1.07
Difference	0.33	-0.05	0.23	0.07
Surprise %	20.20%	-5.80%	14.70%	7.00%

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.64	0.94	5.42	5.7
7 Days Ago	1.64	0.94	5.41	5.7

Recommendation Trends ›



Recommendation Rating ›

2.3

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (11) ›

Average 110.91

Current 111.51

Upgrades & Downgrades ›

30 Days Ago	1.65	0.92	5.41	5.71
60 Days Ago	1.61	0.91	5.33	5.68
90 Days Ago	1.61	0.91	5.33	5.68

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	1	1
Up Last 30 Days	N/A	N/A	1	1
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	DTE	Industry	Sector	S&P 500
Current Qtr.	-16.30%	N/A	N/A	0.20
Next Qtr.	16.00%	N/A	N/A	0.27
Current Year	2.70%	N/A	N/A	0.08
Next Year	5.20%	N/A	N/A	0.11
Next 5 Years (per annum)	4.59%	N/A	N/A	0.10
Past 5 Years (per annum)	6.15%	N/A	N/A	N/A

Initiated	Credit Suisse: to Neutral	[illegible]
Downgrade	UBS: to Neutral	[illegible]
+Upgrade	Bank of America: to Buy	[illegible]
Initiated	Jefferies: to Buy	[illegible]
+Upgrade	Barclays: to Overweight	[illegible]
Initiated	Goldman Sachs: to Neutral	[illegible]

KWalton

DUK 87.25 -1.08 -1.23 % Duke Energy Corporation \(H
10/25/17 12:49 PM

US Markets close in 18 mins

S&P 500	Dow 30	Nasdaq
2,494.33	22,098.36	6,447.61
+6.22 (+0.25%)	+40.99 (+0.19%)	+15.34 (+0.24%)

Duke Energy Corporation (DUK)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

87.25 -1.09 (-1.23%)

As of -. Market open.

People also watch
SO AEP SE D ED

Summary Conversations Statistics Profile Financials Options Holders Historical Data **Analysts**

Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	10	9	19	18
Avg. Estimate	1.64	0.9	4.6	4.83
Low Estimate	1.5	0.82	4.5	4.8
High Estimate	1.76	0.98	4.67	4.85
Year Ago EPS	1.68	0.81	4.69	4.6

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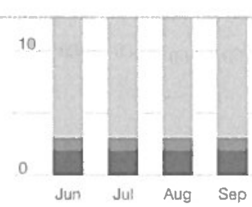
Low Estimate	6.65B	5.28B	23.13B	22.98B
High Estimate	9.86B	6.3B	27.44B	28.93B
Year Ago Sales	6.82B	4.82B	22.74B	24.41B
Sales Growth (year/est)	11.00%	19.40%	7.30%	2.80%



Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	1.58	0.81	1.03	1.01
EPS Actual	1.68	0.81	1.04	1.01
Difference	0.1	0	0.01	0
Surprise %	6.30%	0.00%	1.00%	0.00%

Recommendation Rating ›

3.1

1 Strong Buy 2 Buy 3 Hold 4 Under-perform 5 Sell

Analyst Price Targets (15) ›

Average 86.20

Current 87.25

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	1.64	0.9	4.6	4.83
7 Days Ago	1.64	0.9	4.6	4.83

Upgrades & Downgrades ›

30 Days Ago	1.64	0.9	4.6	4.84
60 Days Ago	1.63	0.87	4.6	4.84
90 Days Ago	1.63	0.88	4.6	4.83

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	N/A
Up Last 30 Days	N/A	N/A	N/A	N/A
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	DUK	Industry	Sector	S&P 500
Current Qtr.	-2.40%	N/A	N/A	0.20
Next Qtr.	11.10%	N/A	N/A	0.27
Current Year	-1.90%	N/A	N/A	0.08
Next Year	5.00%	N/A	N/A	0.11
Next 5 Years (per annum)	2.65%	N/A	N/A	0.10
Past 5 Years (per annum)	0.58%	N/A	N/A	N/A

⇡ +Upgrade	Goldman Sachs: to Buy	[illegible]
Initiated	Credit Suisse: to Neutral	[illegible]
⇣ Downgrade	Citigroup: to Sell	[illegible]
⇣ Downgrade	Bank of America: to Underperform	[illegible]
⇣ Downgrade	Argus Research: to Hold	[illegible]
⇣ Downgrade	JP Morgan: to Neutral	[illegible]

KWalton

CMS 48.10 -1.00 -2.04 % CMS Energy Corporation - Yc
10/25/17 12:49 PM

(•) US Markets close in 19 mins

S&P 500	Dow 30	Nasdaq
2,494.20	22,097.36	6,447.42
+6.09 (+0.24%)	+39.99 (+0.18%)	+15.16 (+0.24%)

CMS Energy Corporation (CMS)

NYSE - Nasdaq Real Time Price. Currency in USD

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Quote Lookup

48.11 -0.99 (-2.02%)

As of -. Market open.

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DTE CNP EIX ETR AEE

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Currency in USD

Earnings Estimate	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
No. of Analysts	7	6	16	16
Avg. Estimate	0.68	0.44	2.17	2.33
Low Estimate	0.63	0.36	2.15	2.28
High Estimate	0.76	0.48	2.18	2.35
Year Ago EPS	0.7	0.29	2.02	2.17

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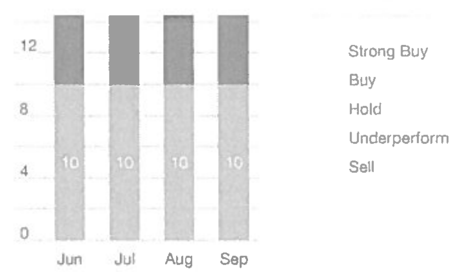
Avg. Estimate	1.74B	1.62B	6.63B	6.82B
Low Estimate	1.64B	1.45B	6.42B	6.55B
High Estimate	1.93B	1.71B	7.03B	7.33B
Year Ago Sales	1.59B	1.64B	6.4B	6.63B
Sales Growth (year/est)	9.70%	-1.20%	3.50%	2.90%



Earnings History	9/29/2016	12/30/2016	3/30/2017	6/29/2017
EPS Est.	0.62	0.29	0.68	0.39
EPS Actual	0.7	0.29	0.71	0.33
Difference	0.08	0	0.03	-0.06
Surprise %	12.90%	0.00%	4.40%	-15.40%

Recommendation Rating >

2.6

1 Strong Buy | 2 Buy | 3 Hold | 4 Under-perform | 5 Sell

Analyst Price Targets (13) >

Average 48.54

Current 48.09

EPS Trend	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Current Estimate	0.68	0.44	2.17	2.33
7 Days Ago	0.68	0.44	2.17	2.33

Upgrades & Downgrades >

30 Days Ago	0.67	0.45	2.17	2.33
60 Days Ago	0.63	0.45	2.17	2.33
90 Days Ago	0.63	0.45	2.17	2.33

EPS Revisions	Current Qtr. (Sep 2017)	Next Qtr. (Dec 2017)	Current Year (2017)	Next Year (2018)
Up Last 7 Days	N/A	N/A	N/A	N/A
Up Last 30 Days	N/A	N/A	N/A	N/A
Down Last 30 Days	N/A	N/A	N/A	N/A
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Estimates	CMS	Industry	Sector	S&P 500
Current Qtr.	-2.90%	N/A	N/A	0.20
Next Qtr.	51.70%	N/A	N/A	0.27
Current Year	7.40%	N/A	N/A	0.08
Next Year	7.40%	N/A	N/A	0.11
Next 5 Years (per annum)	7.52%	N/A	N/A	0.10
Past 5 Years (per annum)	3.67%	N/A	N/A	N/A

Initiated	Guggenheim: to Neutral
Initiated	Morgan Stanley: to Equal-Weight
+Upgrade	Credit Suisse: Neutral to Outperform
+Upgrade	UBS: to Buy
Initiated	Credit Suisse: to Neutral
Initiated	Scotiabank: to Sector Perform

Yahoo Small Business

KWalton

Interest rate forecasts are wrong most of the time - Bus
10/25/17 12:50 PM

BUSINESS INSIDER

Interest rate forecasters are shockingly wrong almost all of the time

AKIN OYEDELE
JUL. 8, 2015, 8:25 AM

Wikimedia Commons

Most interest rate forecasters are wrong most of the time.

Very wrong.

The chart below is from Jeff Gundlach's presentation on Tuesday, comparing the US 10-year yield to median economist forecasts over the past five years.

The black line is the 10-year yield, and the colored lines are the paths that economists thought rates would take.

Clearly, these forecasters were wrong most of the time, as there were only a few instances of convergence between both lines.

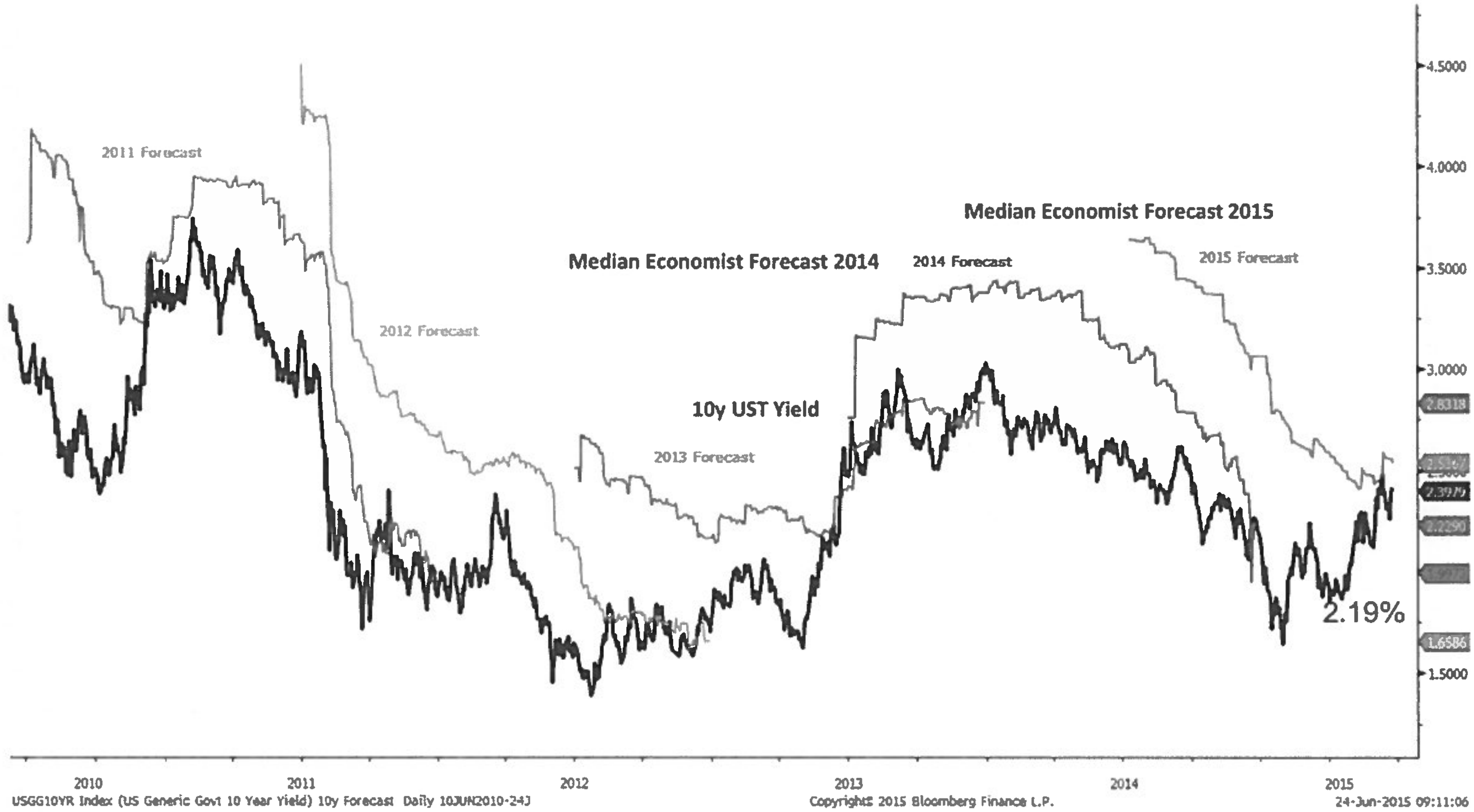
In 2012, forecasters were hugely bleak about the economy, and thought that interest rates would collapse the whole year. Rates ended the year higher than where they started.

Last year was particularly bad, when strategists became too optimistic that the Federal Reserve would hike rates.

This year, forecasters again thought rates would rise and as rates fell, so did those forecasts, which have now converged with interest rates.

10y U.S. Treasury Yield Forecast for Year End 2015

June 10, 2010 through June 24, 2015



Notes: Median economist forecasts are based on Bloomberg survey data.
Source: Bloomberg; Doubleline
You cannot invest directly in an index.

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We Keep Flunking Forecasts on Interest Rates, Distortinç
10/25/17 12:50 PM

The New York Times | http://nyti.ms/1JCtT2A

The Upshot
TODAY'S ECONOMIST

We Keep Flunking Forecasts on Interest Rates, Distorting the Budget Outlook

Jared Bernstein @econjared FEB. 23, 2015

Government economists try to predict the future of lots of indicators, including G.D.P., unemployment and inflation. Their record isn't great, whether here or overseas. No less a figure than the Queen of England said to scholars at the London School of Economics about the deep recession in 2008: "Why did no one see it coming?"

One variable that our government economists keep missing, and it's an important one, is the interest rate of government bonds. That's a big deal because the bond rate determines how much it will cost the government to service our public debt. Interest payments on the debt are projected to be the fastest-growing part of government spending over the next decade.

Overestimate the cost of the debt, as has been the case in recent decades, and the government's future fiscal burden looks significantly worse than it is. That, in turn, creates pressure to cut spending on other priorities in order to set aside enough to service the debt.

In that regard, the picture of how well the economists in various administrations have predicted the rates on 10-year Treasury bonds is particularly revealing. In the early 1980s, forecasters did a good job of predicting the path of bond rates, though their job was a bit easier than usual because rates were so highly elevated that it was a pretty sure bet they'd be headed back down. ("Regression to the mean," for all you statistics fans.)

But since the mid-1990s, government forecasters have consistently overestimated this critical variable.

This "consistently" point is essential. Most economic forecasts are off one way or the other — too high or too low, but they tend to be pretty much balanced in either direction. But on the 10-year bond rate, the errors are systemic.

Forecasters are regularly overestimating and thus regularly overstating, all else being equal, future interest payments on the debt.

Misses like this tell you that forecasters are missing a change in the structure of the economy. Two candidates for why this is happening are a significant increase in global liquidity and what the economist Larry Summers has dubbed "secular stagnation."

Globalization and the spread of so-called financialization — the growth of interconnected financial markets in economies across the globe — have led to a significant increase in the sheer amount of capital and thus the stock of loanable funds. That increased supply has lowered the cost of capital in ways the models are missing.

The stagnation point is more sobering. Bond rates are also pushed down by future expectations about growth and inflation. Especially in the case of longer-term yields like the 10-year bond, investors want to be paid more (that is, they want a higher yield) because of the opportunity cost of locking up their cash over a period when they think growth will be strong. Falling yields could thus signal lowered growth expectations.

This pattern is important because of what it says about future debt payments and pressures to cut the federal budget. Both recent forecasts on Treasury rates from the Congressional Budget Office and the Blue Chip (the consensus among private sector economists) are about the same as the administration's.

The forecasts implied by so-called "forward rates" — rates bond traders can lock in today — for the 10-year bond have adapted more rapidly to the systemic errors and have it sitting about where it is now, around 2 percent, for the next decade. If that's right, it means, all else being equal, the debt-to-G.D.P. ratio will be six percentage points lower in 2025 than the administration is forecasting, a large and significant difference in coming fiscal pressures.

But this observation comes with numerous caveats, the first of which is most salient. Who knows where interest rates will be in 10 years? Even if the market forecasters are correct, our future debt burden is ameliorated, not erased, and so there are still good reasons to tread cautiously. From my own perspective, the point of these figures is not that we're on a long-term, sustainable budget path. It's simply to suggest that based on our recent track record, we may well be overestimating the cost of future debt service and demanding more budget restraint than is necessary.

Second, note the "all else being equal" clause above. If interest rates are coming in lower than predicted because growth is also coming in lower, low growth will cancel out some of the fiscal benefits of low rates. Forecasters have been less systematically wrong regarding G.D.P. growth, and they've broadly marked down future growth rates already. That's led some economists, including Paul Krugman, to question why the lower growth forecasts don't seem to square with the expectation that rates will bounce back up.

Our best move at this point seems to be to work to remove the systemic bias from the models. Economists would say it is probably non-random, that is, we may face an upside fiscal gift in the form of lower rates than we're expecting and thus lower costs of debt service.

So draw in your talons, fiscal hawks. The future is unknowable, but it may be less expensive than we think.

Jared Bernstein is a senior fellow at the Center on Budget and Policy Priorities in Washington and a former chief economist to Vice President Joseph R. Biden Jr. Follow him on Twitter at @econjared.

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American Electric Power Company, Inc. Credit Rating - M
10/25/17 12:50 PM

American Electric Power Company, Inc.

Ticker: AEP Moody's Org ID: 40000 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST

Analyst: Laura Schumacher

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: Senior Unsecured - Dom Curr
Date: 05 Jun 2017

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 05 Jun 2017

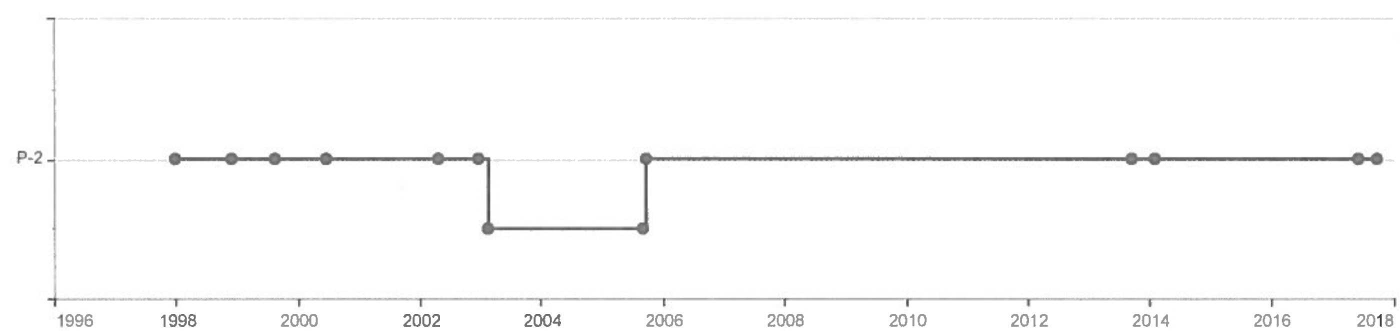
OUTLOOK
Positive
Date: 05 Jun 2017

OTHER DEBTS ON WATCH?
No

Export Results: 4

Class ▲	Rating	Rating Action	Date
Commercial Paper (Domestic)	P-2	RATING AFFIRMATION	05 Jun 2017
Senior Unsecured (Domestic)	Baa1	RATING AFFIRMATION	05 Jun 2017
Senior Unsec. Shelf (Domestic)	(P)Baa1	RATING AFFIRMATION	05 Jun 2017
Junior Subord. Shelf (Domestic)	(P)Baa2	RATING AFFIRMATION	05 Jun 2017

Rating Class History: **Commercial Paper (Domestic)**



Export Results: 14

Date	Currency	Rating	Rating Action
05 Jun 2017	Domestic	P-2	RATING AFFIRMATION
31 Jan 2014	Domestic	P-2	RATING AFFIRMATION
16 Sep 2013	Domestic	P-2	RATING AFFIRMATION
14 Sep 2005	Domestic	P-2	Upgrade
26 Aug 2005	Domestic	P-3	On Watch - Possible Upgrade
10 Feb 2003	Domestic	P-3	Downgrade
11 Dec 2002	Domestic	P-2	On Watch - Possible Downgrade
19 Apr 2002	Domestic	P-2	CONFIRMED
15 Jun 2000	Domestic	P-2	CONFIRMED
13 Aug 1999	Domestic	P-2	CONFIRMED
23 Nov 1998	Domestic	P-2	CONFIRMED
22 Dec 1997	Domestic	P-2	CONFIRMED
31 Dec 1971	Domestic	P-2	Modified Rating Notation
30 Sep 1971	Domestic	P	New

For credit ratings that are derived exclusively from an existing credit rating of a program, series, category/class of debt, support provider or primary rated entity, or that replace a previously assigned provisional rating at the same rating level, Moody's publishes a rating announcement on that series, category/class of debt or program as a whole, on the support provider or primary rated entity, or on the provisional rating, but often does not publish a specific rating announcement on each subsequent bond or note for which the credit rating is derived from the existing credit rating. Rating announcements are usually press releases classified as Rating Actions on www.moodys.com. Please refer to the Research tab on the issuer/entity page for the rating announcement.

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Ameren Corporation Credit Rating - Moody's.pdf
10/25/17 12:50 PM

Ameren Corporation

Ticker: AEE Moody's Org ID: 600041243 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST
Analyst: Jairo Chung

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: LT Issuer Rating
Date: 20 Nov 2015

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 20 Nov 2015

OUTLOOK
Stable
Date: 20 Nov 2015

OTHER DEBTS ON WATCH?
No

Results 1 - 50 Of 66 Page 1 Of 2

Filter By: Document Type - All Source - All

Date	Document Type	Title	Source
09 Mar 2017	Credit Opinion	Ameren Corporation: Regulated Electric and Gas Utility Holding Company	Moody's Investors Service
10 Mar 2016	Credit Opinion	Ameren Corporation: Regulated Electric and Gas Utility Holding Company	Moody's Investors Service
20 Nov 2015	Rating Action	Moody's Assigns Baa1 rating to Ameren Corporation Senior Notes	Moody's Investors Service
07 Jul 2015	Announcement	Correction to Text, April 07, 2015 Release: Moody's upgrades Ameren Corp. and Ameren Illinois; affirms Union Electric; outlooks stable	Moody's Investors Service
08 Apr 2015	Credit Opinion	Ameren Corporation	Moody's Investors Service
07 Apr 2015	Rating Action	Moody's upgrades Ameren Corp. and Ameren Illinois; affirms Union Electric; outlooks stable	Moody's Investors Service
31 Jan 2014	Rating Action	Moody's upgrades Ameren Corp and subsidiary ratings by one notch; Outlooks stable	Moody's Investors Service
08 Nov 2013	Rating Action	Moody's places ratings of most US regulated utilities on review for upgrade	Moody's Investors Service
14 Mar 2013	Rating Action	Moody's downgrades Ameren Genco's senior unsecured and Corporate Family Ratings to B3 from B2; outlook negative	Moody's Investors Service
20 Dec 2012	Announcement	Moody's places Ameren Energy Generating Under Review for Downgrade	Moody's Investors Service
27 Sep 2012	Issuer Comment	Illinois' Extension on Emission Reductions Buys Ameren Genco Time, a Credit Positive	Moody's Investors Service
12 Jun 2012	Rating Action	Moody's upgrades Ameren Illinois	Moody's Investors Service
12 Apr 2012	Rating Action	Moody's downgrades Ameren Genco's senior unsecured rating to Ba3; outlook negative	Moody's Investors Service
29 Mar 2012	Announcement	Moody's puts Ameren Genco on review for possible downgrade; affirms Ameren Corporation	Moody's Investors Service
16 Mar 2012	Announcement	Moody's Disclosures on Credit Ratings of Ameren Corporation	Moody's Investors Service
29 Feb 2012	Rating Action	Moody's Downgrades Ameren Genco to Ba2; Places Ameren Illinois on Review for Possible Upgrade	Moody's Investors Service
05 Dec 2011	Announcement	Moody's Puts Ameren Energy Generating on Review for Possible Downgrade	Moody's Investors Service
06 Oct 2011	Rating Action	Moody's assigns Prime-3 short-term rating for commercial paper to Ameren Illinois	Moody's Investors Service
01 Mar 2011	Rating Action	Moody's Downgrades Ameren Genco to Ba1, Outlook is Negative	Moody's Investors Service
01 Dec 2010	Rating Action	Moody's Puts Ameren Energy Generating On Review for Possible Downgrade	Moody's Investors Service
05 Oct 2010	Rating Action	Moody's affirms ratings of Ameren Illinois Company upon reorganization	Moody's Investors Service
10 Sep 2010	Announcement	Moody's affirms AmerenCIPS Baa1 senior secured rating pending merger	Moody's Investors Service
22 Jul 2010	Announcement	Moody's Changes Ameren Energy Generating Outlook to Negative	Moody's Investors Service

15 Mar 2010	Issuer Comment	Moody's Says Ameren Illinois Reorganization Will Not Affect Ratings	Moody's Investors Service
13 Aug 2009	Rating Action	Moody's Upgrades Ameren Illinois Utilities to Investment Grade	Moody's Investors Service
01 Jul 2009	Issuer Comment	Moody's Views Ameren Bank Facility Extension as Credit Supportive	Moody's Investors Service
16 Jun 2009	Covenant Quality Assessment	Ameren Corporation - $425 million 8.875% Senior Notes due 2014	Moody's Investors Service
16 Feb 2009	Announcement	Moody's Affirms Ameren Ratings; Dividend Cut Is Credit Positive	Moody's Investors Service
29 Jan 2009	Rating Action	Moody's Changes Rating Outlook of Ameren's Illinois Utilities to Stable	Moody's Investors Service
30 Sep 2008	Issuer Comment	Moody's Comments on Ameren's Illinois Utility Delivery Service Rate Case Outcome	Moody's Investors Service
13 Aug 2008	Rating Action	Moody's Downgrades Ameren and AmerenGenco; Outlook Stable	Moody's Investors Service
21 May 2008	Rating Action	Moody's Downgrades Union Electric; Places Ameren and AmerenGenco On Review	Moody's Investors Service
12 Feb 2008	Rating Action	Moody's places Union Electric under review for possible downgrade	Moody's Investors Service
29 Aug 2007	Rating Action	Moody's confirms ratings of Ameren and Illinois subsidiaries	Moody's Investors Service
24 Jul 2007	Issuer Comment	MOODY'S COMMENTS ON UTILITY SETTLEMENT AGREEMENT IN ILLINOIS	Moody's Investors Service
24 Apr 2007	Announcement	Moody's says Ameren Illinois Utility Ratings Unchanged by Senate Bill	Moody's Investors Service
12 Mar 2007	Rating Action	Moody's downgrades Ameren & utility subs, ratings remain on review	Moody's Investors Service
20 Dec 2006	Liquidity Risk Assessment	Ameren Corporation	Moody's Investors Service
08 Dec 2006	Issuer Comment	Moody's Comments on Recent Illinois Legislative and Regulatory Developments Impacting Ameren	Moody's Investors Service
10 Nov 2006	Issuer Comment	Moody's Comments on Potential Illinois Rate Freeze Legislation	Moody's Investors Service
10 Oct 2006	Rating Action	Moody's puts Ameren & its subsidiaries on review for downgrade	Moody's Investors Service
26 Jul 2006	Rating Action	MOODY'S DOWNGRADES UNION ELECTRIC (SR. UNS. TO A3), CIPS (SR. UNS. TO Baa3), CILCORP (SR. UNS. TO Ba1), AND CILCO (SR. UNS. TO Baa2); CONFIRMS AMEREN CORPORATION AND ILLINOIS POWER; OUTLOOK NEGATIVE FOR AMEREN AND FOUR ILLINOIS SUBSIDIARIES	Moody's Investors Service
20 Dec 2005	Analysis	Ameren Corporation	Moody's Investors Service
15 Dec 2005	Rating Action	MOODY'S DOWNGRADES LONG TERM DEBT RATINGS OF AMEREN CORP (SR. UNSEC. TO Baa1) AND FOUR ILLINOIS SUBS. RATINGS REMAIN ON REVIEW; PLACES AMEREN'S SHORT TERM RATINGS AND UNION ELECTRIC'S RATINGS ON REVIEW FOR POSSIBLE DOWNGRADE	Moody's Investors Service
30 Sep 2005	Rating Action	MOODY'S PLACES THE LONG TERM DEBT RATINGS OF AMEREN CORPORATION (A3 SR. UNS.) AND FOUR ILLINOIS SUBSIDIARIES UNDER REVIEW FOR POSSIBLE DOWNGRADE	Moody's Investors Service
22 Aug 2005	Corp Governance Assmt-Update	Ameren Corporation	Moody's Investors Service
31 Mar 2005	Rating Action	MOODY'S UPGRADES THE RATINGS OF ILLINOIS POWER COMPANY (Sr. Sec. to Baa1 from Baa3); OUTLOOK IS STABLE	Moody's Investors Service
18 Mar 2005	Rating Action	MOODY'S PLACES DEBT RATINGS OF ILLINOIS POWER COMPANY (Sr. Sec. Baa3) UNDER REVIEW FOR POSSIBLE UPGRADE	Moody's Investors Service
30 Nov 2004	Corporate Governance Assmt	Ameren Corporation	Moody's Investors Service
01 Oct 2004	Rating Action	MOODY'S UPGRADES THE RATINGS OF ILLINOIS POWER COMPANY (Sr. Sec. to Baa3 from Ba3); RATING OUTLOOK IS STABLE	Moody's Investors Service

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Dominion Energy, Inc. Credit Rating - Moody's.pdf
10/25/17 12:50 PM

Dominion Energy, Inc.

Ticker: D Moody's Org ID: 243115 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST
Analyst: Ryan Wobbrock

LONG TERM RATING
Rating: Baa2, Not on Watch
Type: Senior Unsecured - Dom Curr
Date: 01 Feb 2016

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 01 Feb 2016

OUTLOOK
Stable
Date: 01 Feb 2016

OTHER DEBTS ON WATCH?
No

Research | Ratings | Family Tree | Peer Group | Market Signals

Issuer Research | Industry Research | Family Tree Research | Methodology

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Filter By: Document Type - All | Source - All

Date	Document Type	Title	Source
07 Aug 2017	Issuer Comment	With Quorum at Regulator, TransCanada, Enbridge and Dominion Pipelines Can Advance, a Credit Positive	Moody's Investors Service
28 Jul 2017	Credit Opinion	Dominion Energy, Inc.: Large, Diversified Electric and Midstream Holding Company	Moody's Investors Service
05 Jul 2017	Rating Action	Moody's changes Dominion Energy Gas Holdings outlook to negative from stable	Moody's Investors Service
20 Jan 2017	Credit Opinion	Dominion Resources Inc.: Large, Diversified Electric and Midstream Holding Company	Moody's Investors Service
04 Nov 2016	Issuer In-Depth	Peer Comparison: Dominion and Sempra: US Regulated Utilities	Moody's Investors Service
23 Sep 2016	Company Profile	Dominion Resources Inc.	Moody's Investors Service
21 Jul 2016	Credit Opinion	Dominion Resources Inc.: Large, Diversified Electric and Midstream Holding Company	Moody's Investors Service
01 Feb 2016	Rating Action	Moody's Affirms Dominion Resources' ratings on Questar Acquisition Announcement	Moody's Investors Service
21 Jan 2016	Credit Opinion	Dominion Resources Inc.: Large and Diversified Energy Holding Company	Moody's Investors Service
09 Nov 2015	Company Profile	Dominion Resources Inc.	Moody's Investors Service
22 Jul 2015	Credit Opinion	Dominion Resources Inc.	Moody's Investors Service
06 Oct 2014	Credit Focus	Dominion Resources Inc. – Well positioned to preserve credit quality as MLP launches	Moody's Investors Service
03 Feb 2014	Issuer Comment	Brayton Point Shutdown Is Credit Positive for New England Power Producers	Moody's Investors Service
30 Jan 2014	Rating Action	Moody's upgrades Virginia Electric and Power Company and Dominion Gas Holdings; confirms Dominion Resources at Baa2, rating outlooks stable	Moody's Investors Service
08 Nov 2013	Rating Action	Moody's places ratings of most US regulated utilities on review for upgrade	Moody's Investors Service
16 Sep 2013	Issuer Comment	US Authorization to Export Liquefied Natural Gas Is Credit Positive for Dominion Resources	Moody's Investors Service
13 Sep 2013	Issuer Comment	Dominion Resources re-organization seeks more transparency and financing efficiency	Moody's Investors Service
17 Feb 2013	Issuer Comment	Amended Virginia Utility Law Requires Some Give-Backs for VEPCO and APCO	Moody's Investors Service
19 Apr 2012	Announcement	Moody's Disclosures on Credit Ratings of Dominion Resources Inc.	Moody's Investors Service
15 Nov 2011	Issuer Comment	NRC Authorizes Post-Quake Restart of North Anna Nuclear Power Station, A Credit Positive for Owners Dominion and ODEC	Moody's Investors Service
05 Sep 2011	Issuer Comment	Earthquake Closes North Anna Nuke Plant for Now, a Credit Negative for Dominion and ODEC	Moody's Investors Service
31 Aug 2011	Issuer Comment	Hurricane Irene has no immediate rating implications for electric utilities in its path	Moody's Investors Service

17 Mar 2011	Market Signals Review	Electric Utility Credit Market Signals after the Earthquake: Sharp Sell-off in Japan, Limited Impact in the US (Capital Markets Research)		Moody's Analytics
07 Feb 2011	Analysis	Dominion Resources Inc.	🔒	Moody's Investors Service
15 Mar 2010	Issuer Comment	Dominion's divestiture of oil and gas E&P activities viewed positively	🔒	Moody's Investors Service
21 Jan 2010	Issuer Comment	VEPCO's rate case proceeding expected to be resolved positively	🔒	Moody's Investors Service
05 Jan 2010	Issuer Comment	Dominion's sale of natural gas LDC property viewed as a neutral credit event	🔒	Moody's Investors Service
14 May 2009	Analysis	Dominion Resources Inc	🔒	Moody's Investors Service
29 Apr 2009	Rating Action	Moody's changes VEPCO rating outlook to positive, affirms Dominion Resources' ratings		Moody's Investors Service
05 Aug 2008	Issuer Comment	Moody's comments on Dominion Resources' key ratings drivers	🔒	Moody's Investors Service
29 Feb 2008	Covenant Quality Assessment	Dominion Resources Inc. - MTN, Series A; MTN, Series B; 7.40% due '12; 7.82% due '14, Floating Rate due '12; 7.195% due '14; 8.125% due '10; 5.75% due '08 (not all securities listed, but are included in the attached document)	🔒	Moody's Investors Service
15 Jan 2008	Issuer Comment	Moody's comments on Dominion's terminated gas distribution sale to Equitable Resources	🔒	Moody's Investors Service
30 Oct 2007	Issuer Comment	Moody's Comments on Dominion Resources' Dividend Increase	🔒	Moody's Investors Service
30 Oct 2007	Issuer Comment	Moody's Comments on Dominion Resources' Dividend Increase	🔒	Moody's Investors Service
09 Jul 2007	Rating Action	Moody's downgrades Consolidated Natural Gas's debt		Moody's Investors Service
19 Jun 2007	Issuer Comment	MOODY'S COMMENTS ON DOMINION TENDER OFFER	🔒	Moody's Investors Service
01 Jun 2007	Rating Action	Moody's reviews Consolidated Natural Gas for downgrade		Moody's Investors Service
07 Dec 2006	Issuer Comment	MOODY'S COMMENTS ON DOMINION'S ANNOUNCED SALE OF ITS E&P RESERVES	🔒	Moody's Investors Service
01 Nov 2006	Issuer Comment	MOODY'S COMMENTS ON DOMINION'S ANNOUNCED SALE OF ITS E&P RESERVES	🔒	Moody's Investors Service
06 Oct 2006	Rating Action	Moody's Assigns Baa3 Rating to Dominion Resources Series B Enhanced Jr Sub Notes		Moody's Investors Service
14 Aug 2006	Rating Action	MOODY'S UPGRADES ELWOOD ENERGY TO Ba1 (SR. SEC.) FROM Ba2; OUTLOOK IS STABLE		Moody's Investors Service
29 Jun 2006	Rating Action	MOODY'S ASSIGNS Baa3 RATING TO ENHANCED JUNIOR SUBORDINATED NOTES OF DOMINION RESOURCES, INC		Moody's Investors Service
26 Apr 2006	Liquidity Risk Assessment	Dominion Resources Inc	🔒	Moody's Investors Service
21 Apr 2006	Issuer Comment	MOODY'S COMMENTS ON VIRGINIA ENERGY BILL AMENDMENT	🔒	Moody's Investors Service
29 Mar 2006	Rating Action	MOODY'S DOWNGRADES LONG-TERM DEBT RATINGS OF DOMINION RESOURCES, INC AND SUBSIDIARIES; RATING OUTLOOK STABLE		Moody's Investors Service
03 Mar 2006	Issuer Comment	MOODY'S COMMENTS ON DOMINION'S SALE OF TWO GAS DISTRIBUTION COMPANIES	🔒	Moody's Investors Service
24 Jan 2006	Corp Governance Assmt-Update	Dominion Resources Inc.	🔒	Moody's Investors Service
09 Jan 2006	Rating Action	MOODY'S PLACES THE RATINGS FOR DOMINION RESOURCES AND SUBSIDIARIES UNDER REVIEW FOR POSSIBLE DOWNGRADE		Moody's Investors Service
27 Jun 2005	Analysis	Dominion Resources Inc.	🔒	Moody's Investors Service
30 Nov 2004	Corp Governance Assmt-Update	Dominion Resources Inc.	🔒	Moody's Investors Service

Results 1 - 50 Of 78

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Sempra Energy Credit Rating - Moody's.pdf
10/25/17 12:50 PM

Sempra Energy

Ticker: SRE Moody's Org ID: 600046021 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST

Analyst: Natividad Martel

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: LT Issuer Rating
Date: 09 Jul 2015

OUTLOOK
Stable
Date: 09 Jul 2015

OTHER DEBTS ON WATCH?
No

Results 1 - 48 Of 48 Page 1 Of 1

Filter By: Document Type - All Source - All

Date	Document Type	Title	Source
21 Aug 2017	Issuer Comment	Sempra Energy: Acquisition of EFH's stake in Oncor, combined with the delay of Cameron, will weaken credit metrics, a credit negative	Moody's Investors Service
01 Dec 2016	Issuer Comment	Sempra's Postponement of Peruvian Gas Pipeline Investment Is Credit Positive	Moody's Investors Service
04 Nov 2016	Issuer In-Depth	Peer Comparison: Dominion and Sempra: US Regulated Utilities	Moody's Investors Service
31 Oct 2016	Sector In-Depth	Infrastructure, Autos, State Government - California : Electric Car Growth Boosts Utilities; Mixed Implications for Autos and State Finances	Moody's Investors Service
20 Oct 2016	Issuer Comment	IEnova's Capital Increase Is Credit Positive for It and Parent Sempra	Moody's Investors Service
22 Jul 2016	Credit Opinion	Sempra Energy: A Diversified Holding Company	Moody's Investors Service
28 Apr 2016	Issuer Comment	Sempra Energy: Sempra Energy's Sale of Its EnergySouth Unit Is Credit Positive	Moody's Investors Service
10 Jul 2015	Announcement	Moody's: Rate Reform for Californian Utilities, a credit positive	Moody's Investors Service
10 Jul 2015	Credit Opinion	Sempra Energy	Moody's Investors Service
09 Jul 2015	Rating Action	Moody's affirms Sempra Energy	Moody's Investors Service
16 Jun 2015	Issuer Comment	Sempra Energy: Sempra's ratings unaffected by MLP news	Moody's Investors Service
15 Aug 2014	Rating Action	Moody's Assigns A3 to Cameron LNG's $2.915 Billion Senior Secured Credit Facility; Outlook Stable	Moody's Investors Service
17 Feb 2014	Issuer Comment	Cameron Liquefied Natural Gas Export Permit Is Credit Positive for Sempra Energy	Moody's Investors Service
30 Jan 2014	Rating Action	Moody's upgrades Sempra utility subsidiaries; outlooks stable	Moody's Investors Service
06 Dec 2013	Announcement	Corrección al texto, Comunicado de Prensa del 16 de enero de 2013: Moody's califica los certificados bursátiles de Sempra México en Aaa.mx	Moody's Investors Service
06 Dec 2013	Announcement	Correction to text, January 16, 2013 Release: Moody's rates Sempra Mexico certificados bursátiles Aaa.mx	Moody's Investors Service
09 Jul 2013	Rating Action	Moody's affirms Southern California Gas at A2 positive	Moody's Investors Service
23 May 2013	Issuer Comment	LNG Export Approval Is Credit Positive for US Exporters and the Japanese Supply Chain	Moody's Investors Service
16 Jan 2013	Rating Action	Moody's rates Sempra Mexico certificados bursátiles Aaa.mx	Moody's Investors Service
20 Jan 2011	Issuer Comment	Moody's: Sempra's purchase of AEI's interest in South American utilities positive for credit quality	Moody's Investors Service
24 Feb 2010	Issuer Comment	Moody's: Sempra's purchase of El Paso's Mexican natural gas business credit neutral	Moody's Investors Service
16 Feb 2010	Announcement	Moody's affirms Sempra's ratings, outlook stable	Moody's Investors Service
11 Nov 2009	Issuer Comment	Moody's: Sempra's ratings unaffected by RBS' potential sale of the commodities JV	Moody's Investors Service

28 Jul 2008	Announcement	Moody's affirms Sempra's ratings; outlook stable	Moody's Investors Service
03 Jul 2008	Covenant Quality Assessment	Sempra Energy - Notes: $500 million 7.95% due 2010; $400 million 6.00% due 2013; $300 million 4.75% due 2009; $500 million 6.15% due 2018	Moody's Investors Service
01 Apr 2008	Issuer Comment	Moody's sees no rating change at Sempra from JV formation	Moody's Investors Service
09 Jul 2007	Announcement	Moody's: RBSG's Ratings (Senior at Aa1, negative outlook) affirmed on Joint Venture with Sempra Energy (Baa1 Sr unsecured)	Moody's Investors Service
09 Jul 2007	Announcement	Moody's affirms Sempra's ratings	Moody's Investors Service
22 Dec 2006	Liquidity Risk Assessment	Sempra Energy	Moody's Investors Service
12 May 2006	Rating Action	MOODY'S RATES ROCKIES EXPRESS PIPELINE LLC PRIME-2 FOR COMMERCIAL PAPER; OUTLOOK STABLE	Moody's Investors Service
06 Jan 2006	Announcement	MOODY'S AFFIRMS RATINGS OF SEMPRA ENERGY (Baa1 SR. UNS.), SOUTHERN CALIFORNIA GAS (A2 SR UNS) AND SAN DIEGO GAS AND ELECTRIC (A2 SR UNS.) FOLLOWING SETTLEMENT OF CONTINENTAL FORGE LITIGATION; RATING OUTLOOK STABLE	Moody's Investors Service
21 Dec 2005	Corp Governance Assmt-Update	Sempra Energy	Moody's Investors Service
19 Dec 2005	Analysis	Sempra Energy	Moody's Investors Service
14 Dec 2004	Analysis	Sempra Energy	Moody's Investors Service
13 Dec 2004	Corporate Governance Assmt	Sempra Energy	Moody's Investors Service
29 Oct 2004	Financial Reporting Assessment	Sempra Energy	Moody's Investors Service
05 May 2004	Financial Statement Ratios	Sempra Energy	Moody's Investors Service
25 Oct 2002	Analysis	Sempra Energy	Moody's Investors Service
30 Sep 2002	Rating Action	MOODY'S DOWNGRADES SEMPRA ENERGY TO Baa1 FROM A2 (SR. UNSEC.); ALSO DOWNGRADES SAN DIEGO GAS AND ELECTRIC TO A1 FROM Aa3 (SR. SEC.)	Moody's Investors Service
22 Apr 2002	Rating Action	MOODY'S PLACES THE RATINGS OF SEMPRA ENERGY (SR. UNS.: A2; CP: PRIME-1) AND THE LONG-TERM RATINGS OF SAN DIEGO GAS AND ELECTRIC COMPANY (SR. SEC.: Aa3) UNDER REVIEW FOR POSSIBLE DOWNGRADE. ALSO, CONFIRMS THE RATINGS OF SOUTHERN CALIFORNIA GAS COMPANY (SR.	Moody's Investors Service
27 Jul 2001	Rating Action	MOODY'S RE-CALIBRATES ITS PREFERRED STOCK RATING SCALE TO PROMOTE CROSS-SECTOR COMPARABILITY	Moody's Investors Service
25 Jun 2001	Rating Action	MOODY'S CONFIRMS THE RATINGS OF SEMPRA ENERGY (A2 SR. UNSECURED) AND SAN DIEGO GAS & ELECTRIC COMPANY (AA3 SR. UNSECURED). RATING OUTLOOK FOR BOTH COMPANIES REMAINS NEGATIVE.	Moody's Investors Service
25 Jun 2001	Rating Action	MOODY'S CONFIRMS THE RATINGS OF SEMPRA ENERGY (A2 SR. UNSECURED) AND SAN DIEGO GAS & ELECTRIC COMPANY (Aa3 SR. UNSECURED). RATING OUTLOOK FOR BOTH COMPANIES REMAINS NEGATIVE.	Moody's Investors Service
08 Jan 2001	Rating Action	MOODY'S AFFIRMS ITS RATINGS OF SEMPRA ENERGY AND SAN DIEGO GAS AND ELECTRIC COMPANY	Moody's Investors Service
24 Oct 2000	Analysis	Sempra Energy	Moody's Investors Service
06 Sep 2000	Rating Action	MOODY'S CHANGES THE RATING OUTLOOK FOR SAN DIEGO GAS & ELECTRIC AND SEMPRA ENERGY TO NEGATIVE	Moody's Investors Service
26 Jan 2000	Rating Action	MOODY'S CONFIRMS THE RATINGS OF SEMPRA ENERGY AND ITS SUBSIDIARIES FOLLOWING ITS ANNOUNCEMENT OF A DIVIDEND REDUCTION AND A SHARE REPURCHASE PROGRAM	Moody's Investors Service
28 Sep 1999	Rating Action	MOODY'S ASSIGNS FIRST TIME ISSUER RATING OF A2 TO SEMPRA ENERGY	Moody's Investors Service

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Southern Company \(The\) Credit Rating - Moody’s.pdf
10/25/17 12:50 PM

Southern Company (The)

Ticker: SO Moody's Org ID: 694000 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST

Analyst: Michael G. Haggarty

LONG TERM RATING
Rating: Baa2, Not on Watch
Type: Senior Unsecured - Dom Curr
Date: 20 Mar 2017

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 20 Mar 2017

OUTLOOK
Stable
Date: 20 Mar 2017

OTHER DEBTS ON WATCH?
No

Research | Ratings | Family Tree | Peer Group | Market Signals

Issuer Research | Industry Research | Family Tree Research | Methodology

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Filter By: Document Type - All Source - All

Date ▼	Document Type	Title	Source
21 Sep 2017	Rating Action	Moody's confirms Mississippi Power's ratings; outlook stable	Moody's Investors Service
18 Sep 2017	Rating Action	Moody's assigns Baa1 rating to Georgia Power's Junior Subordinated Notes	Moody's Investors Service
22 Jun 2017	Rating Action	Moody's places Mississippi Power ratings on review for downgrade	Moody's Investors Service
12 Jun 2017	Issuer Comment	Georgia Power Company: Georgia Power makes some progress in reducing Vogtle uncertainty, but challenges remain	Moody's Investors Service
26 May 2017	Company Profile	Southern Company (The): Key Facts and Statistics - FY December 2016	Moody's Investors Service
18 May 2017	Credit Opinion	Southern Company (The): Diversified Electric & Gas Utility and Wholesale Power Holding Company	Moody's Investors Service
20 Mar 2017	Rating Action	Moody's changes Georgia Power outlook to negative, affirms Southern with stable outlook	Moody's Investors Service
01 Mar 2017	Rating Action	Moody's downgrades Mississippi Power, assigns Ba1 CFR, outlook negative	Moody's Investors Service
06 Feb 2017	Rating Action	Moody's places Mississippi Power Company on review for downgrade	Moody's Investors Service
18 Nov 2016	Credit Opinion	Southern Company (The): Diversified Electric & Gas Utility and Wholesale Power Holding Company	Moody's Investors Service
18 Jul 2016	Issuer Comment	Southern Company Further Diversifies into Natural Gas with Credit-Positive Pipeline Acquisition	Moody's Investors Service
11 Jul 2016	Rating Action	Moody's affirms Southern Company at Baa2 stable following Southern Natural Gas pipeline investment	Moody's Investors Service
20 May 2016	Credit Opinion	SOUTHERN COMPANY (THE): Regulated utility and wholesale power holding company	Moody's Investors Service
13 May 2016	Rating Action	Moody's downgrades Southern Company to Baa2 stable; affirms subsidiary ratings and outlooks	Moody's Investors Service
06 May 2016	Company Profile	Southern Company (The)	Moody's Investors Service
16 Mar 2016	Issuer Comment	Mississippi Power Company: Term Loan Agreement Improves Constrained Liquidity Profile	Moody's Investors Service
25 Feb 2016	Credit Opinion	Southern Company (The): Regulated utility and wholesale power holding company	Moody's Investors Service
06 Nov 2015	Credit Focus	US Regulated Utilities: Duke Energy and Southern Company: A Peer Comparison	Moody's Investors Service
05 Nov 2015	Rating Action	Moody's downgrades Mississippi Power to Baa3, negative outlook; affirms Southern, negative outlook	Moody's Investors Service
29 Oct 2015	Sector Comment	US Utilities: Vogtle and Summer Agreements Are Credit Positive, But Challenges Remain	Moody's Investors Service
05 Oct 2015	Rating Action	Moody's assigns Baa2 rating to new Southern Company Junior Subordinated Notes	Moody's Investors Service

31 Aug 2015	Market Signals Review	Market Signals Review: Southern Company: Two Market-Implied Ratings Decline	Moody's Analytics
27 Aug 2015	Issuer Comment	Southern's Acquisition of AGL Resources Will Significantly Increase Debt	Moody's Investors Service
25 Aug 2015	Credit Opinion	Southern Company (The)	Moody's Investors Service
24 Aug 2015	Rating Action	Moody's affirms Southern Company ratings, changes outlook to negative	Moody's Investors Service
14 Aug 2015	Rating Action	Moody's Downgrades Mississippi Power to Baa2, negative; affirms Southern, stable	Moody's Investors Service
30 Jun 2015	Company Profile	Southern Company (The)	Moody's Investors Service
27 May 2015	Rating Action	Moody's puts Mississippi Power on review for downgrade; affirms Southern's ratings	Moody's Investors Service
07 Apr 2015	Announcement	Moody's: Georgia Power Vogtle order credit negative, demonstrating the limits of regulatory support	Moody's Investors Service
19 Feb 2015	Rating Action	Moody's changes Mississippi Power outlook to negative; affirms Southern's ratings	Moody's Investors Service
05 Aug 2014	Announcement	Moody's: Mississippi Power's Settlement with Sierra Club is Credit Positive	Moody's Investors Service
10 Jun 2014	Company Profile	Southern Company (The)	Moody's Investors Service
09 Jun 2014	Credit Focus	Georgia Power and South Carolina Electric & Gas: Peer Comparison	Moody's Investors Service
03 Apr 2014	Announcement	Moody's: Latest Kemper plant cost increases are credit negative but will not affect Mississippi Power or Southern Company's rating or stable rating outlook	Moody's Investors Service
06 Aug 2013	Rating Action	Moody's Downgrades Mississippi Power to Baa1; Outlook Stable	Moody's Investors Service
09 Jul 2013	Company Profile	Southern Company (The)	Moody's Investors Service
30 May 2013	Rating Action	Moody's Puts Mississippi Power on Review for Possible Downgrade; Affirms Southern	Moody's Investors Service
11 Mar 2013	Announcement	Moody's: Cost Increases and Delays at Georgia Power's New Nuclear Project are Credit Negative but Manageable at Current Rating Levels	Moody's Investors Service
06 Aug 2012	Rating Action	Moody's downgrades Mississippi Power to A3; Outlook Negative	Moody's Investors Service
09 Jul 2012	Announcement	Moody's Puts Mississippi Power on Review for Downgrade; Affirms Southern Company	Moody's Investors Service
16 Mar 2012	Announcement	Moody's Disclosures on Credit Ratings of Southern Company (The)	Moody's Investors Service
09 Jan 2012	Issuer Comment	Nuclear Reactor Design Certification Is Positive for New Nuclear Development in the US	Moody's Investors Service
22 Nov 2010	Announcement	Moody's Views Pending Georgia Power Rate Settlement as Credit Supportive	Moody's Investors Service
12 Aug 2010	Rating Action	Moody's Downgrades Southern Company and Three Utilities	Moody's Investors Service
17 Jun 2010	Rating Action	Moody's Puts Southern and Three Utilities On Review for Possible Downgrade	Moody's Investors Service
01 Sep 2009	Rating Action	Moody's Changes Outlook of Southern and Three Subs to Negative	Moody's Investors Service
27 May 2009	Covenant Quality Assessment	Southern Company (The) - $600 million Series 2008A Floating Rate Senior Notes due 2010; $500 million Series 2007A 5.30% Senior Notes due 2012; $350 million Series 2009A 4.15% Senior Notes due 2014	Moody's Investors Service
16 Mar 2009	Analysis	Southern Company (The)	Moody's Investors Service
30 Jun 2008	Issuer Comment	Moody's Sees No Material Credit Impact from Southern Company's Leveraged Lease Charges	Moody's Investors Service
30 Jan 2008	Analysis	Southern Company (The)	Moody's Investors Service

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NextEra Energy, Inc. Credit Rating - Moody's.pdf
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NextEra Energy, Inc.

Ticker: FPL Moody's Org ID: 276230 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST

Analyst: Jeffrey F. Cassella

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: LT Issuer Rating - Dom Curr
Date: 29 Jul 2016

OUTLOOK
Stable
Date: 29 Jul 2016

OTHER DEBTS ON WATCH?
No

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Filter By: Document Type - All | Source - All

Date	Document Type	Title	Source
26 Jul 2017	Credit Opinion	NextEra Energy, Inc.: A Major Hybrid Utility and Power Company	Moody's Investors Service
24 Apr 2017	Announcement	Moody's: NextEra Energy unaffected amidst regulators' denial of proposed Oncor acquisition	Moody's Investors Service
18 Apr 2017	Company Profile	NextEra Energy, Inc.: Key Facts and Statistics - FYE December 2016	Moody's Investors Service
01 Mar 2017	Issuer In-Depth	NextEra Energy, Inc.: Preparing to Raise $20 Billion of Capital in 2017 to Finance Oncor Acquisition, Ongoing Projects	Moody's Investors Service
25 Jan 2017	Credit Opinion	NextEra Energy, Inc.: A Major Hybrid Utility and Power Company	Moody's Investors Service
23 Jan 2017	Issuer Comment	NextEra Energy's Sale of FiberNet Is Credit Positive	Moody's Investors Service
02 Nov 2016	Announcement	Moody's: NextEra's Acquisition Financing of Oncor Minority Interest is Credit Positive	Moody's Investors Service
03 Aug 2016	Credit Opinion	NextEra Energy, Inc : A Major Hybrid Utility and Power Company	Moody's Investors Service
01 Aug 2016	Issuer Comment	NextEra's Acquisition of Oncor Is Credit Positive for Both	Moody's Investors Service
29 Jul 2016	Rating Action	Moody's affirms NextEra Energy (Baa1 stable) on Oncor acquisition announcement	Moody's Investors Service
21 Jul 2016	Issuer In-Depth	NextEra Energy, Inc : A Look at NextEra's Financing Options as Investments in Renewables Soar Outside of Its Utility Business	Moody's Investors Service
18 Jul 2016	Issuer Comment	NextEra Energy, Inc.: No rating impact on NextEra Energy after Hawaii merger terminated	Moody's Investors Service
21 Apr 2016	Credit Opinion	NextEra Energy, Inc.: A Major Hybrid Utility and Power Company	Moody's Investors Service
05 Apr 2016	Company Profile	NextEra Energy, Inc.	Moody's Investors Service
17 Mar 2016	Announcement	Moody's: Sponsor strategy drives yieldco credit quality during market uncertainty while MLPs offer potential insight into sector recovery	Moody's Investors Service
17 Mar 2016	Sector In-Depth	Unregulated Power – US: Sponsor Strategy Is Key for Renewable Yieldcos; MLPs Yield Lessons on Growth	Moody's Investors Service
29 Feb 2016	Issuer Comment	NextEra Energy Raises Equity Through Its Yieldco, a Credit Positive	Moody's Investors Service
03 Dec 2015	Issuer Comment	NextEra Energy's Sale of Two Texas Power Plants Is Credit Positive	Moody's Investors Service
27 Oct 2015	Credit Opinion	NextEra Energy, Inc	Moody's Investors Service
04 Aug 2015	Issuer Comment	NextEra Energy, Inc : Ratings Unaffected by Mexican Pipe Deal, Dividend Increase	Moody's Investors Service
24 Mar 2015	Company Profile	NextEra Energy, Inc	Moody's Investors Service
03 Dec 2014	Rating Action	Moody's affirms NextEra Energy Baa1 stable	Moody's Investors Service
23 Jun 2014	Credit Focus	NextEra Energy, Inc.: A Deep Dive into the Yieldco	Moody's Investors Service

22 May 2014	Rating Action	Moody's affirms NextEra at Baa1 stable	Moody's Investors Service
08 May 2014	Company Profile	NextEra Energy, Inc.	Moody's Investors Service
03 Feb 2014	Issuer Comment	Brayton Point Shutdown Is Credit Positive for New England Power Producers	Moody's Investors Service
21 May 2013	Company Profile	NextEra Energy, Inc.	Moody's Investors Service
15 Jun 2012	Issuer Comment	NextEra Heightens Renewable Project Risk Disclosure in Most Recent Financing	Moody's Investors Service
09 Apr 2010	Rating Action	Moody's Downgrades FPL Group to Baa1 and FP&L to A2	Moody's Investors Service
19 Jan 2010	Rating Action	Moody's Places FPL Group and Subsidiaries on Review for Downgrade	Moody's Investors Service
07 Oct 2009	Issuer Comment	Moody's Views Politicized Florida Rate Cases as Credit Negative	Moody's Investors Service
12 Sep 2007	Rating Action	Moody's assigns A3 rating to FPL Group Capital Jr. Sub Debentures	Moody's Investors Service
11 Jun 2007	Rating Action	Moody's assigns A3 rating to FPL Group Capital Jr Sub Debentures	Moody's Investors Service
27 Nov 2006	Liquidity Risk Assessment	FPL Group, Inc.	Moody's Investors Service
31 Oct 2006	Rating Action	Moody's changes FPL Group and FP&L outlook to stable from negative	Moody's Investors Service
16 Oct 2006	Analysis	FPL Group, Inc.	Moody's Investors Service
20 Sep 2006	Rating Action	Moody's assigns A3 to FPL Group Capital's jr. sub. debentures	Moody's Investors Service
11 Aug 2006	Corporate Governance Assmt	FPL Group, Inc.	Moody's Investors Service
17 Jan 2006	Corp Governance Assmt-Update	FPL Group, Inc.	Moody's Investors Service
27 Dec 2005	Analysis	FPL Group, Inc.	Moody's Investors Service
19 Dec 2005	Rating Action	MOODY'S AFFIRMS RATINGS OF FPL GROUP (A2 ISSUER RATING), FPL GROUP CAPITAL (A2 SR. UNS.), AND FLORIDA POWER & LIGHT COMPANY (A1 ISSUER RATING); REVISES RATING OUTLOOK TO NEGATIVE	Moody's Investors Service
01 Sep 2005	Analysis	FPL Group, Inc.	Moody's Investors Service
10 Feb 2005	Rating Action	MOODY'S ASSIGNS Baa3 RATING TO FPL NATIONAL WIND'S PROPOSED ISSUE OF SENIOR SECURED BONDS; ALSO, ASSIGNS Ba2 RATING TO NATIONAL WIND PORTFOLIO'S PROPOSED ISSUE OF SENIOR SECURED BONDS; STABLE OUTLOOK	Moody's Investors Service
26 Jan 2005	Rating Action	MOODY'S CHANGES RATING OUTLOOK OF FPL GROUP CAPITAL (A2 SR. UNSEC.) TO STABLE; ASSIGNS A2 ISSUER RATING TO FPL GROUP, INC.; STABLE OUTLOOK	Moody's Investors Service
12 Oct 2004	Corp Governance Assmt-Update	FPL Group, Inc.	Moody's Investors Service
24 Aug 2004	Financial Reporting Assessment	FPL Group, Inc.	Moody's Investors Service
28 May 2004	Rating Action	MOODY'S UPGRADES FPL ENERGY CAITHNESS FUNDING CORPORATION TO Baa3, OUTLOOK STABLE	Moody's Investors Service
23 Dec 2003	Financial Reporting Assessment	FPL Group, Inc.	Moody's Investors Service
12 Dec 2003	Corporate Governance Assmt	FPL Group, Inc.	Moody's Investors Service

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Public Service Enterprise Group Incorporated Credit Rati
10/25/17 12:50 PM

Public Service Enterprise Group Incorporated

Ticker: PEG Moody's Org ID: 444900 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST
Analyst: Jairo Chung

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: Senior Unsecured - Dom Curr
Date: 24 Jul 2017

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 24 Jul 2017

OUTLOOK
Stable
Date: 24 Jul 2017

OTHER DEBTS ON WATCH?
No

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Filter By: Document Type - All   Source - All

Date	Document Type	Title	Source
26 Jul 2017	Credit Opinion	Public Service Enterprise Group Incorporated: Diversified holding company of PSE&G and PSEG Power	Moody's Investors Service
24 Jul 2017	Rating Action	Moody's upgrades rating of PSEG Inc. to Baa1; outlook stable; subsidiary ratings affirmed	Moody's Investors Service
19 Oct 2016	Announcement	Moody's: Carbon reduction policies bring risk, opportunities for global unregulated utilities	Moody's Investors Service
09 Sep 2016	Credit Opinion	Public Service Enterprise Group Incorporated: Diversified holding company of PSE&G and PSEG Power	Moody's Investors Service
11 Sep 2015	Credit Opinion	Public Service Enterprise Group Incorporated	Moody's Investors Service
09 Sep 2015	Rating Action	Moody's changes PSEG Inc. outlook to positive; affirms subsidiary ratings	Moody's Investors Service
25 Feb 2013	Issuer Comment	PSEG's Post-Superstorm Sandy Investments Are Credit Positive	Moody's Investors Service
06 Nov 2012	Special Comment	Sandy Hits New York Area Investor-Owned Utilities Hard But Leaves Credit Quality Intact	Moody's Investors Service
20 Apr 2012	Announcement	Moody's Disclosures on Credit Ratings of Public Service Enterprise Group Incorporated	Moody's Investors Service
04 May 2011	Announcement	Moody's affirms ratings of PSEG, PSEG Power & PSE&G; PSE&G's outlook revised to positive	Moody's Investors Service
20 Jul 2010	Rating Action	Moody's withdraws PSEG Energy Holdings' ratings due to inadequate information.	Moody's Investors Service
17 Jul 2008	Rating Action	Moody's changes rating outlook for PSEG and PSE&G to stable.	Moody's Investors Service
17 May 2007	Liquidity Risk Assessment	Public Service Enterprise Group Incorporated	Moody's Investors Service
02 Jan 2007	Issuer Comment	Moody's views PSEG's sale of Lawrenceburg facility positively	Moody's Investors Service
15 Sep 2006	Rating Action	Moody's Changes Outlook Of Public Svc Enterprise And PSE&G To Negative	Moody's Investors Service
10 Mar 2006	Analysis	Public Service Enterprise Group Incorporated	Moody's Investors Service
07 Jan 2005	Analysis	Public Service Enterprise Group Incorporated	Moody's Investors Service
20 Dec 2004	Rating Action	MOODY'S AFFIRMS RATINGS OF PUBLIC SERVICE ENTERPRISE GROUP AND SUBSIDIARIES FOLLOWING ANNOUNCEMENT OF PLANNED MERGER WITH EXELON CORPORATION; REVISES OUTLOOK FOR ENTERPRISE GROUP AND PSEG POWER TO STABLE FROM NEGATIVE	Moody's Investors Service
30 Sep 2004	Financial Reporting Assessment	Public Service Enterprise Group Incorporated	Moody's Investors Service
13 Sep 2004	Corporate Governance Assmt	Public Service Enterprise Group Incorporated	Moody's Investors Service
06 Aug 2004	Rating Action	MOODY'S CHANGES RATING OUTLOOK FOR PSEG POWER LLC (Baa1 SR. UNSEC.) TO NEGATIVE FROM STABLE	Moody's Investors Service

11 May 2004	Financial Statement Ratios	Public Service Enterprise Group Incorporated	Moody's Investors Service
07 Oct 2003	Analysis	Public Service Enterprise Group Incorporated	Moody's Investors Service
26 Sep 2003	Rating Action	MOODY'S CONFIRMS PRIME-2 RATING FOR COMMERCIAL PAPER OF PUBLIC SERVICE ENTERPRISE GROUP INC.; RATING OUTLOOK IS NEGATIVE	Moody's Investors Service
12 Sep 2003	Rating Action	MOODY'S DOWNGRADES PSEG ENERGY HOLDINGS (TO Ba3 SR. UNSEC.); CONFIRMS LONG-TERM RATINGS OF PUBLIC SERVICE ENTERPRISE GROUP (Baa2 SR. UNSEC.) CONFIRMS PSEG POWER (Baa1 SR. UNS.); PUBLIC SERVICE ENTERPRISE'S PRIME-2 RATING REMAINS ON REVIEW FOR DOWNGRADE	Moody's Investors Service
16 Jun 2003	Rating Action	MOODY'S PLACES PUBLIC SERVICE ENTERPRISE GROUP INC. (Baa2 SR. UNSEC.), PSEG POWER LLC (Baa1 SR. UNSEC.), AND PSEG ENERGY HOLDINGS LLC (Baa3 SR. UNSEC.) under REVIEW FOR POSSIBLE DOWNGRADE; AFFIRMS PUBLIC SERVICE ELECTRIC AND GAS COMPANY (A3 SR. SEC.)	Moody's Investors Service
28 Aug 2002	Analysis	Public Service Enterprise Group Incorporated	Moody's Investors Service
27 Jul 2001	Rating Action	MOODY'S RE-CALIBRATES ITS PREFERRED STOCK RATING SCALE TO PROMOTE CROSS-SECTOR COMPARABILITY	Moody's Investors Service
07 Apr 2000	Rating Action	MOODY'S ASSIGNS A PRIME-2 SHORT-TERM RATING FOR THE COMMERCIAL PAPER PROGRAM OF PUBLIC SERVICE ENTERPRISE GROUP INC.	Moody's Investors Service
06 Jan 1998	Rating Action	MOODY'S ASSIGNS (P)"baa2" TO SHELF OF ENTERPRISE CAPITAL TRUST I, II and III	Moody's Investors Service

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SCANA Corporation Credit Rating - Moody's.pdf
10/25/17 12:50 PM

SCANA Corporation

Ticker: SCG Moody's Org ID: 662400 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST

Analyst: Laura Schumacher

LONG TERM RATING
Rating: Baa3, Not on Watch
Type: LT Issuer Rating
Date: 01 Aug 2017

SHORT TERM RATING
Rating: P-3, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 01 Aug 2017

OUTLOOK
Negative
Date: 01 Aug 2017

OTHER DEBTS ON WATCH?
No

Research | Ratings | Family Tree | Peer Group | Market Signals

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Date	Document Type	Title	Source
21 Aug 2017	Credit Opinion	SCANA Corporation: Update following decision to abandon nuclear construction	Moody's Investors Service
07 Aug 2017	Issuer Comment	South Carolina Electric Utilities Terminate Nuclear Plant Construction, a Credit Positive	Moody's Investors Service
01 Aug 2017	Rating Action	Moody's Affirms SCE&G and SCANA, outlook remains negative	Moody's Investors Service
20 Mar 2017	Rating Action	Moody's changes outlook for SCANA and SCE&G to negative, ratings affirmed	Moody's Investors Service
02 Nov 2016	Credit Opinion	SCANA Corporation: Regulated utility holding company	Moody's Investors Service
28 Oct 2016	Rating Action	Moody's revises outlook for SCANA and subsidiaries to stable	Moody's Investors Service
29 Oct 2015	Sector Comment	US Utilities: Vogtle and Summer Agreements Are Credit Positive, But Challenges Remain	Moody's Investors Service
14 Sep 2015	Credit Opinion	SCANA Corporation	Moody's Investors Service
11 Sep 2015	Rating Action	Moody's changes the outlook for SCANA and subsidiaries to negative	Moody's Investors Service
04 Sep 2015	Issuer Comment	SCANA Corporation: SCANA Corp. Will Benefit from South Carolina's Approval of Nuclear Unit Cost Overruns	Moody's Investors Service
18 Mar 2015	Issuer Comment	US Utilities: New nuclear project's risks and declining financial metrics have developed into a material credit negative for SCANA	Moody's Investors Service
16 Mar 2015	Rating Action	Moody's affirms SCANA and SCE&G ratings; outlooks remain stable	Moody's Investors Service
16 Dec 2014	Issuer Comment	SCANA Corporation: SCANA's sale of non-core assets will strengthen liquidity and help fund new nuclear construction, a credit positive	Moody's Investors Service
14 Aug 2014	Issuer Comment	Delayed Nuclear Construction Schedule Is Credit Negative for SCANA and Santee Cooper	Moody's Investors Service
09 Jun 2014	Credit Focus	Georgia Power and South Carolina Electric & Gas: Peer Comparison	Moody's Investors Service
20 Apr 2012	Announcement	Moody's Disclosures on Credit Ratings of SCANA Corporation	Moody's Investors Service
09 Jan 2012	Issuer Comment	Nuclear Reactor Design Certification Is Positive for New Nuclear Development in the US	Moody's Investors Service
15 Sep 2011	Rating Action	Moody's downgrades the senior unsecured rating of SCANA to Baa3 and the senior unsecured rating of South Carolina Electric and Gas to Baa2 ; Outlooks revised to Stable	Moody's Investors Service
01 Aug 2011	Announcement	Moody's places the ratings of SCANA Corp. and certain ratings of SCE&G on Review for Downgrade and affirms ratings of PSNC	Moody's Investors Service
19 Oct 2010	Rating Action	Moody's assigns Prime-2 to SCANA's commercial paper program	Moody's Investors Service
22 Jul 2010	Analysis	SCANA Corporation	Moody's Investors Service
14 Jul 2009	Rating Action	Moody's downgrades SCANA, SCE&G and affirms PSNC; rating outlooks changed to negative	Moody's Investors Service

29 Dec 2008	Issuer Comment	Moody's comments on SCANA Corporation	🔒	Moody's Investors Service
14 Dec 2007	Analysis	SCANA Corporation	🔒	Moody's Investors Service
04 Dec 2007	Rating Action	Moody's Downgrades SCANA and Its Rated Subsidiaries One Notch		Moody's Investors Service
31 May 2007	Rating Action	Moody's places all ratings for SCANA on review for possible downgrade		Moody's Investors Service
28 Mar 2007	Liquidity Risk Assessment	SCANA Corporation	🔒	Moody's Investors Service
10 Oct 2006	Rating Action	Moody's changes SCANA Corp's outlook to stable from negative		Moody's Investors Service
16 Sep 2005	Financial Reporting Assessment	SCANA Corporation	🔒	Moody's Investors Service
29 Jul 2005	Corporate Governance Assmt	SCANA Corporation	🔒	Moody's Investors Service
23 May 2005	Analysis	SCANA Corporation	🔒	Moody's Investors Service
03 Dec 2004	Rating Action	MOODY'S AFFIRMS RATINGS FOR SCANA AND SOUTH CAROLINA ELECTRIC AND GAS AND CHANGES RATINGS OUTLOOK TO NEGATIVE FROM STABLE; AFFIRMS RATINGS AND RATING OUTLOOK FOR PUBLIC SERVICE COMPANY OF NORTH CAROLINA		Moody's Investors Service
04 May 2004	Financial Statement Ratios	SCANA Corporation	🔒	Moody's Investors Service
25 Jun 2001	Rating Action	MOODY'S REVISES OUTLOOK FOR SCANA CORPORATION TO STABLE FROM NEGATIVE, AND REVISES OUTLOOK FOR PUBLIC SERVICE OF NORTH CAROLINA TO STABLE FROM POSITIVE		Moody's Investors Service
27 Nov 2000	Analysis	SCANA Corporation	🔒	Moody's Investors Service
15 Dec 1999	Rating Action	MOODY'S CONFIRMS RATINGS OF SCANA CORPORATION AT A3 SR. UNSEC. WITH A NEGATIVE OUTLOOK; CONFIRMS SCE&G A1 SR. SEC. RATINGS WITH A STABLE OUTLOOK, AND CONFIRMS PSNC AT A2 SR. UNSEC. WITH A POSITIVE OUTLOOK. MOODY'S ALSO RATES SCANA AND SCE&G BANK LOANS		Moody's Investors Service
17 Feb 1999	Rating Action	MOODY'S REVIEWS SCANA FOR POSSIBLE DOWNGRADE (A3 SR. UNS.) AND CONFIRMS DEBT RATINGS OF SOUTH CAROLINA ELECTRIC & GAS CO. (A1 SR. SEC.) AND PUBLIC SERVICE CO. OF NORTH CAROLINA (A2 SR. UNS.)		Moody's Investors Service
24 Oct 1996	Rating Action	MOODY'S CONFIRMS DEBT RATINGS OF SOUTH CAROLINA ELECTRIC AND GAS (Sr. Sec. A1) AND SCANA CORP. (Sr. Unsec. at A3), BUT LOWERS PREFERRED STOCK RATING TO 'a2'		Moody's Investors Service
23 May 1996	Rating Action	MOODY'S REVIEWS CREDIT RATINGS OF SOUTH CAROLINA ELECTRIC AND GAS (Sr. Sec. A1) AND SCANA CORP. (Sr. Unsec. at A3) FOR POSSIBLE DOWNGRADE		Moody's Investors Service

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DTE Energy Company Credit Rating - Moody's.pdf
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DTE Energy Company

Ticker: DTE Moody's Org ID: 600020607 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST
Analyst: Lesley Ritter

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: Senior Unsecured - Dom Curr
Date: 25 Oct 2016

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 25 Oct 2016

OUTLOOK
Stable
Date: 25 Oct 2016

OTHER DEBTS ON WATCH?
No

Research | Ratings | Family Tree | Peer Group | Market Signals

Issuer Research | Industry Research | Family Tree Research | Methodology

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Filter By: Document Type - All Source - All

Date ▾	Document Type	Title	Source
04 Nov 2016	Credit Opinion	DTE ENERGY COMPANY: Regulated utility holding company	Moody's Investors Service
25 Oct 2016	Rating Action	Moody's downgrades DTE to Baa1, affirms utility subsidiaries, outlook stable	Moody's Investors Service
03 Oct 2016	Issuer Comment	DTE's Purchase of Stonewall Stake Benefits Target, but Increases Credit Risk for Buyer	Moody's Investors Service
27 Sep 2016	Rating Action	Moody's places DTE Energy on review for downgrade	Moody's Investors Service
18 Feb 2016	Credit Opinion	DTE Energy Company: Regulated utility holding company	Moody's Investors Service
13 Mar 2015	Credit Focus	US Utilities: CMS and DTE: Peer Comparison	Moody's Investors Service
19 Feb 2015	Credit Opinion	DTE Energy Company	Moody's Investors Service
31 Jan 2014	Rating Action	Moody's upgrades DTE Energy Company and its two subsidiaries, outlooks stable	Moody's Investors Service
08 Nov 2013	Rating Action	Moody's places ratings of most US regulated utilities on review for upgrade	Moody's Investors Service
05 Mar 2013	Rating Action	Moody's upgrades DTE Energy Center to Ba1, outlook stable	Moody's Investors Service
21 Feb 2013	Announcement	Correction to text, February 08, 2013 Release: Moody's upgrades the long-term ratings of DTE Energy and its subsidiaries	Moody's Investors Service
08 Feb 2013	Rating Action	Moody's upgrades the long-term ratings of DTE Energy and its subsidiaries	Moody's Investors Service
30 Mar 2012	Announcement	Moody's Disclosures on Credit Ratings of DTE Energy Company	Moody's Investors Service
27 Feb 2012	Announcement	Moody's changes the rating outlook for DTE and its regulated subsidiaries to positive from stable	Moody's Investors Service
16 Sep 2010	Rating Action	Moody's rates credit facilities of DTE and subs; existing ratings affirmed	Moody's Investors Service
30 Jun 2009	Covenant Quality Assessment	DTE Energy Company - Notes issued under Indenture dated as of April 9, 2001 Coupon and maturity range: 6.35%-7.625%, 2011-2033 See Appendix C for a complete list of Reference Securities	Moody's Investors Service
21 Dec 2006	Liquidity Risk Assessment	DTE Energy Company	Moody's Investors Service
29 Sep 2005	Corp Governance Assmt-Update	DTE Energy Company	Moody's Investors Service
10 May 2005	Analysis	DTE Energy Company	Moody's Investors Service
22 Apr 2005	Rating Action	MOODY'S AFFIRMS DTE ENERGY COMPANY (Sr. Unsec. Baa2) AND THE DETROIT EDISON COMPANY (Issuer Rating Baa1) AND REVISES RATING OUTLOOK TO STABLE FROM NEGATIVE	Moody's Investors Service
24 Dec 2004	Analysis	DTE Energy Company	Moody's Investors Service

24 Aug 2004	Financial Reporting Assessment	DTE Energy Company	Moody's Investors Service
07 Jul 2004	Corp Governance Assmt-Update	DTE Energy Company	Moody's Investors Service
11 Mar 2004	Financial Statement Ratios	DTE Energy Company	Moody's Investors Service
28 Jan 2004	Rating Action	MOODY'S CONFIRMS RATINGS OF DTE ENERGY (Sr. Unsec. Baa2) AND DETROIT EDISON (Sr. Sec. A3), CHANGES OUTLOOK TO NEGATIVE; PLACES MICHIGAN CONSOLIDATED GAS (Sr. Sec. A2) UNDER REVIEW FOR POSSIBLE DOWNGRADE	Moody's Investors Service
23 Dec 2003	Financial Reporting Assessment	DTE Energy Company	Moody's Investors Service
19 Dec 2003	Corporate Governance Assmt	DTE Energy Company	Moody's Investors Service
16 May 2001	Rating Action	MOODY'S INVESTORS SERVICE ASSIGNS MULTIPLE RATINGS (SR. UNSEC. (P)Baa2) TO DTE ENERGY COMPANY'S SHELF REGISTRATION AND A PRIME-2 SHORT TERM RATING TO THE COMPANY'S EXPANDED COMMERCIAL PAPER PROGRAM	Moody's Investors Service

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Duke Energy Corporation Credit Rating - Moody's.pdf
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Duke Energy Corporation

Ticker: DUK Moody's Org ID: 809360313 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST
Analyst: Laura Schumacher

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: LT Issuer Rating - Dom Curr
Date: 12 May 2017

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 12 May 2017

OUTLOOK
Stable
Date: 12 May 2017

OTHER DEBTS ON WATCH?
No

Research | Ratings | Family Tree | Peer Group | Market Signals

Issuer Research | Industry Research | Family Tree Research | Methodology

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Date	Document Type	Title	Source
22 May 2017	Credit Opinion	Duke Energy Corporation: Large regulated utility holding company	Moody's Investors Service
12 May 2017	Rating Action	Moody's revises outlook for Duke Energy to stable; affirms Duke and key subsidiaries	Moody's Investors Service
16 Mar 2017	Credit Opinion	Duke Energy Corporation: Large regulated utility holding company	Moody's Investors Service
13 Oct 2016	Issuer Comment	Duke Energy's Agreements to Sell Its Latin American Businesses Are Credit Positive	Moody's Investors Service
08 Aug 2016	Credit Opinion	Duke Energy Corporation: Large regulated utility holding company	Moody's Investors Service
05 Aug 2016	Rating Action	Moody's affirms Duke Energy at Baa1; outlook remains negative	Moody's Investors Service
08 Feb 2016	Issuer Comment	Duke Energy Considers Selling Its International Business, a Credit Positive	Moody's Investors Service
15 Jan 2016	Credit Opinion	Duke Energy Corporation: Largest regulated utility holding company in the US	Moody's Investors Service
13 Jan 2016	Rating Action	Moody's downgrades Duke, Progress, and Duke Energy Progress; Duke outlook negative	Moody's Investors Service
25 Nov 2015	Credit Opinion	Duke Energy Corporation	Moody's Investors Service
06 Nov 2015	Credit Focus	US Regulated Utilities: Duke Energy and Southern Company: A Peer Comparison	Moody's Investors Service
27 Oct 2015	Rating Action	Moody's puts Duke Energy, Progress Energy and Duke Energy Progress on review for downgrade	Moody's Investors Service
05 Jun 2015	Rating Action	Moody's changes outlook of Duke Energy, Progress Energy and Duke Energy Progress to negative	Moody's Investors Service
09 Apr 2015	Issuer Comment	Duke Energy Sells Competitive Generation Business, a Credit Positive	Moody's Investors Service
22 Sep 2014	Market Signals Review	Duke Energy Corp.: Two Market-Implied Ratings Lose Steam (Capital Markets Research)	Moody's Analytics
28 Aug 2014	Issuer Comment	North Carolina's Passage of Coal Ash Legislation Is Credit Negative for Duke Energy	Moody's Investors Service
31 Jan 2014	Rating Action	Moody's upgrades Duke Energy and five subsidiaries; outlooks stable	Moody's Investors Service
08 Nov 2013	Rating Action	Moody's places ratings of most US regulated utilities on review for upgrade	Moody's Investors Service
30 Oct 2013	Announcement	Correction to Text, September 25, 2013 Release: Moody's upgrades Duke Energy and three utility subsidiaries	Moody's Investors Service
25 Sep 2013	Rating Action	Moody's upgrades Duke Energy and three utility subsidiaries	Moody's Investors Service
09 Jul 2013	Rating Action	Moody's places Duke Energy and three utility subsidiaries on review for possible upgrade	Moody's Investors Service
13 Jun 2013	Issuer Comment	Start-up at Duke Energy's Edwardsport Power Plant Is Credit Positive	Moody's Investors Service

08 Feb 2013	Announcement	Moody's: Duke Crystal River 3 retirement entails tradeoffs, but is overall credit positive	Moody's Investors Service
30 Nov 2012	Announcement	Moody's: Duke Settlement Increases Succession Uncertainty and Regulatory Risk	Moody's Investors Service
17 Sep 2012	Credit Focus	Duke Energy Corporation: Answers to Frequently Asked Questions Since Its Merger with Progress Energy, Inc.	Moody's Investors Service
03 Jul 2012	Rating Action	Moody's affirms Duke, Progress and subsidiary ratings following merger, outlooks stable	Moody's Investors Service
18 Jun 2012	Issuer Comment	Duke Energy and Progress Energy's Merger Wins FERC Approval, a Credit Positive	Moody's Investors Service
16 Mar 2012	Announcement	Moody's Disclosures on Credit Ratings of Duke Energy Corporation	Moody's Investors Service
10 Jan 2011	Rating Action	Moody's affirms Duke Energy and Progress Energy's Baa2 senior unsecured ratings following merger announcement, rating outlooks stable	Moody's Investors Service
22 Sep 2010	Issuer Comment	Duke Energy Indiana's Edwardsport settlement neutral to ratings	Moody's Investors Service
16 Oct 2009	Analysis	Duke Energy Corporation	Moody's Investors Service
17 Apr 2009	Covenant Quality Assessment	Duke Energy Carolinas, LLC (f/k/a Duke Power Corporation) - Notes issued under Indenture dated September 1, 1998; Coupon and maturity range: 3.55%-7.125%, 2012-2037	Moody's Investors Service
17 Apr 2009	Covenant Quality Assessment	Duke Energy Carolinas, LLC (f/k/a Duke Power Corporation) - $500 million 6.10% Senior Notes due 2037	Moody's Investors Service
25 Mar 2009	Covenant Quality Assessment	Duke Energy Corporation - Senior Notes: $250 million 5.625% due 2013; $750 million 6.30% due 2014; $250 million 6.25% due 2018	Moody's Investors Service
23 Jan 2009	Rating Action	Moody's changes Duke Energy Ohio's rating outlook to positive	Moody's Investors Service
18 Jan 2008	Rating Action	Moody's changes outlook on Duke Energy to stable	Moody's Investors Service
28 Dec 2007	Rating Action	Moody's assigns Ba2 corporate family rating to Duke Paranapanema	Moody's Investors Service
28 Dec 2007	Rating Action	Moody's assigns A1.br rating to Duke Paranapanema's debentures	Moody's Investors Service
11 Sep 2007	Issuer Comment	MOODY'S COMMENTS ON DUKE ENERGY'S REVISED LONG TERM STRATEGIC PLANS	Moody's Investors Service
31 Aug 2007	Issuer Comment	Moody's Comments on Prospects for Ohio Electric Re-Regulation	Moody's Investors Service
27 Jun 2007	Rating Action	Moody's assigns Prime-2 rating to Duke Energy Corporation's CP program	Moody's Investors Service
24 Oct 2006	Liquidity Risk Assessment	Duke Energy Corporation	Moody's Investors Service
04 Oct 2006	Rating Action	Moody's reviews Duke Capital for upgrade	Moody's Investors Service
02 Aug 2006	Rating Action	MOODY'S CHANGES DUKE ENERGY FIELD SERVICES' OUTLOOK TO STABLE	Moody's Investors Service
06 Apr 2006	Rating Action	MOODY'S ASSIGNS Baa2 ISSUER RATING TO DUKE ENERGY CORPORATION, UPGRADES DUKE POWER LLC, DUKE CAPITAL LLC, AND TEXAS EASTERN, POSITIVE RATING OUTLOOK FOR DUKE ENERGY AND SEVERAL SUBSIDIARIES	Moody's Investors Service

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Eversource Energy Credit Rating - Moody's.pdf
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Eversource Energy

Ticker: ES Moody's Org ID: 552500 Market Segment: Infrastructure & Project Finance
Industry: UTILITY: REG - ELECTR - INTEGRATED - HOLDCO Peer Group: Regulated Electric and Gas Utilities
Domicile: UNITED STATES

ANALYST
Analyst: Jeffrey F. Cassella

LONG TERM RATING
Rating: Baa1, Not on Watch
Type: LT Issuer Rating
Date: 31 Jan 2014

SHORT TERM RATING
Rating: P-2, Not on Watch
Type: Commercial Paper - Dom Curr
Date: 31 Jan 2014

OUTLOOK
Stable
Date: 31 Jan 2014

OTHER DEBTS ON WATCH?
No

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Filter By: Document Type - All Source - All

Date	Document Type	Title	Source
16 Jun 2017	Credit Opinion	Eversource Energy: Regulated utility holding company in New England	Moody's Investors Service
05 Jun 2017	Issuer Comment	Eversource Energy: Acquisition of Aquarion water utilities has no immediate impact on ratings or outlook	Moody's Investors Service
16 Jun 2016	Credit Opinion	Eversource Energy: Regulated utility holding company in New England	Moody's Investors Service
08 Oct 2015	Credit Opinion	Eversource Energy	Moody's Investors Service
31 Jan 2014	Rating Action	Moody's upgrades NU and five subsidiaries, outlooks stable	Moody's Investors Service
08 Nov 2013	Rating Action	Moody's places ratings of most US regulated utilities on review for upgrade	Moody's Investors Service
12 Aug 2013	Issuer Comment	Judge's Recommendation to Cut Return on Equity Is Credit Negative for Transmission Utilities	Moody's Investors Service
06 Nov 2012	Special Comment	Sandy Hits New York Area Investor-Owned Utilities Hard But Leaves Credit Quality Intact	Moody's Investors Service
20 Jul 2012	Rating Action	Moody's assigns Prime-2 short-term rating to Northeast Utilities	Moody's Investors Service
26 Jun 2012	Analysis	Northeast Utilities	Moody's Investors Service
09 Apr 2012	Rating Action	Moody's downgrades NSTAR, NSTAR Electric, and Connecticut Light & Power; affirms NU and its other subsidiaries	Moody's Investors Service
19 Mar 2012	Issuer Comment	NU and NSTAR Merger Advances, with Divergent Credit Implications	Moody's Investors Service
15 Mar 2012	Announcement	Moody's changes the outlook of Connecticut Light and Power to negative	Moody's Investors Service
02 Mar 2012	Announcement	Moody's Disclosures on Credit Ratings of Northeast Utilities	Moody's Investors Service
16 Feb 2012	Announcement	Moody's places ratings of NSTAR and NSTAR Electric under review down	Moody's Investors Service
12 Dec 2011	Announcement	Moody's affirms the ratings of CL&P and NU; outlook remains stable	Moody's Investors Service
31 Aug 2011	Issuer Comment	Hurricane Irene has no immediate rating implications for electric utilities in its path	Moody's Investors Service
18 Oct 2010	Announcement	Moody's affirms ratings of Northeast Utilities and NSTAR following merger announcement	Moody's Investors Service
09 Jul 2010	Announcement	Moody's affirms NU, CL&P, and PSNH ratings; outlooks stable	Moody's Investors Service
07 May 2010	Issuer Comment	Moody's views CTA extension in Connecticut as credit negative	Moody's Investors Service
03 May 2007	Covenant Quality Assessment	Northeast Utilities - Shelf Registration (currently no issuance of Reference Securities)	Moody's Investors Service
29 Dec 2006	Analysis	Northeast Utilities	Moody's Investors Service

27 Oct 2006	Issuer Comment	Moody's views NU's completion of Bethel-Norwalk positively	Moody's Investors Service
18 Sep 2006	Rating Action	Moody's confirms Ba3 sr. sec. debt of Northeast Generation	Moody's Investors Service
01 Aug 2006	Rating Action	MOODY'S DOWNGRADES PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE TO Baa1 FROM A3 (SR. SEC.); OUTLOOK IS STABLE	Moody's Investors Service
26 Jul 2006	Issuer Comment	MOODY'S COMMENTS ON NORTHEAST UTILITIES' SALE OF ITS COMPETITIVE GENERATION ASSETS	Moody's Investors Service
17 Apr 2006	Rating Action	MOODY'S DOWNGRADES NORTHEAST GENERATION COMPANY TO Ba3 FROM Ba1 (SR. SEC.); RATING REMAINS ON REVIEW FOR POSSIBLE FURTHER DOWNGRADE	Moody's Investors Service
17 Apr 2006	Rating Action	MOODY'S PLACES RATINGS OF PUBLIC SVC. CO. OF NEW HAMPSHIRE (A3 SR. SEC.) ON REVIEW FOR POSSIBLE DOWNGRADE; REVISES RATING OUTLOOK OF YANKEE GAS TO NEGATIVE FROM STABLE	Moody's Investors Service
08 Nov 2005	Rating Action	MOODY'S PLACES NORTHEAST GENERATION COMPANY'S DEBT (Ba1 SR. SEC.) UNDER REVIEW FOR POSSIBLE DOWNGRADE	Moody's Investors Service
30 Jun 2005	Financial Reporting Assessment	Northeast Utilities	Moody's Investors Service
08 Jun 2005	Analysis	Northeast Utilities	Moody's Investors Service
16 Feb 2005	Rating Action	MOODY'S DOWNGRADES NORTHEAST UTILITIES TO Baa2 FROM Baa1 (Sr. Unsec.), AND DOWNGRADES FOUR OF ITS SUBSIDIARIES; RATING OUTLOOK IS STABLE	Moody's Investors Service
19 Jan 2005	Rating Action	MOODY'S PLACES RATINGS OF NORTHEAST UTILITIES AND ITS SUBSIDIARIES UNDER REVIEW FOR POSSIBLE DOWNGRADE	Moody's Investors Service
17 Sep 2004	Rating Action	MOODY'S DOWNGRADES DEBT RATING OF NORTHEAST GENERATION COMPANY (Sr. Sec. TO Baa3 FROM Baa2); RATING OUTLOOK IS STABLE	Moody's Investors Service
07 Apr 2004	Financial Statement Ratios	Northeast Utilities	Moody's Investors Service
25 Mar 2004	Rating Action	MOODY'S PLACES LONG-TERM DEBT OF NORTHEAST GENERATION (Sr. Sec. Baa2) UNDER REVIEW FOR POSSIBLE DOWNGRADE	Moody's Investors Service
25 Jul 2003	Rating Action	MOODY'S ASSIGNS FIRST TIME ISSUER RATING OF Baa1 (SR. UNSEC.) TO YANKEE GAS SERVICES COMPANY. OUTLOOK IS STABLE.	Moody's Investors Service
16 May 2003	Rating Action	MOODY'S CONFIRMS RATINGS OF NORTHEAST UTILITIES (SR. UNSEC. AT Baa1) AND CONNECTICUT LIGHT AND POWER (SR. SEC. AT A2); CHANGES RATINGS OUTLOOK OF BOTH COMPANIES TO NEGATIVE FROM STABLE	Moody's Investors Service
03 Dec 2002	Analysis	Northeast Utilities	Moody's Investors Service
05 Dec 2001	Analysis	Northeast Utilities	Moody's Investors Service
12 Nov 2001	Rating Action	MOODY'S RAISES NORTHEAST UTILITES (SR. UNSEC. TO Baa1) AND AFFILITATE RATINGS	Moody's Investors Service
07 Mar 2001	Rating Action	MOODY'S COMMENTS ON THE STATUS OF MERGER AGREEMENT BETWEEN NORTHEAST UTILITIES AND CONSOLIDATED EDISON, INC.	Moody's Investors Service
26 Jan 2001	Rating Action	CORRECTION: MOODY'S RAISES RATINGS OF NORTHEAST UTILITIES AND AFFILIATES (PREFERRED STOCK RATINGS RAISED TO "ba2 FROM "ba3, NOT TO "ba1 FROM "ba3")	Moody's Investors Service
04 Apr 2000	Rating Action	MOODY'S UPGRADES LONG-TERM DEBT RATINGS OF NORTHEAST UTILITIES, PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, AND NORTH ATLANTIC ENERGY CORP. SYSTEM RATINGS REMAIN UNDER REVIEW FOR POSSIBLE UPGRADE.	Moody's Investors Service
13 Oct 1999	Rating Action	MOODY'S REVIEWS RATINGS OF NORTHEAST UTILITIES AND ITS PRINCIPAL SUBSIDIARIES FOR POSSIBLE UPGRADE; ALSO REVIEWS RATINGS OF CONSOLIDATED EDISON, INC. AND ITS PRINCIPAL SUBSIDIARIES FOR POSSIBLE DOWNGRADE FOLLOWING TODAY'S MERGER ANNOUNCEMENT	Moody's Investors Service
16 Jun 1999	Rating Action	MOODY'S PLACES ON REVIEW FOR POSSIBLE UPGRADE RATINGS OF PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, NORTH ATLANTIC ENERGY, INC. AND NORTHEAST UTILITIES	Moody's Investors Service
25 May 1999	Rating Action	MOODY'S UPGRADES NORTHEAST UTILITIES TO Ba3; AND ITS CONNECTICUT LIGHT & POWER AND WESTERN MASSACHUSETTS ELECTRIC COMPANY SUBSIDIARIES TO Baa3	Moody's Investors Service
10 May 1999	Rating Action	MOODY'S REVIEWS SECURITY RATINGS OF NORTHEAST UTILITIES AND ITS CONNECTICUT AND MASSACHUSETTS SUBS FOLLOWING RESTART OF MILLSTONE UNIT 2.	Moody's Investors Service
22 Jul 1998	Rating Action	RESTART OF MILLSTONE UNIT 3 NUCLEAR PLANT TRIGGERS MOODY'S UPGRADE AND POSITIVE OUTLOOK FOR NORTHEAST UTILITIES AND ITS CONN. AND MASS. SUBSIDIARIES	Moody's Investors Service
21 Apr 1998	Rating Action	MOODY'S DOWNGRADES RATINGS OF CONNECTICUT LIGHT & POWER AND WESTERN MASSACHUSETTS ELECTRIC (SR.SEC TO Ba3), AND THEIR PARENT, NORTHEAST UTILITIES (SR UNSEC TO B2); RATINGS REMAIN UNDER REVIEW, DIRECTION UNCERTAIN	Moody's Investors Service

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AEP.pdf
10/25/17 12:50 PM

American Electric Power Co. Inc.

Issuer Credit Rating

Rating Type	Rating	Rating Date	Regulatory Identifiers	CreditWatch/ Outlook	CreditWatch/ Outlook Date
Local Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/105713/coreRatingId/816891861)	02-Feb-2017	EE	Stable	02-Feb-2017
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/105713/coreRatingId/816891864)	15-Jun-2000	EE		
Foreign Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/105713/coreRatingId/816891865)	02-Feb-2017	EE	Stable	02-Feb-2017
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/105713/coreRatingId/816891860)	15-Jun-2000	EE		

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Credit Conditions: Rising Risks In Areas Such As Retail And CRE May Weigh On Credit Conditions In North America (/en_US/web/guest/article/-/view/type/HTML/id/1877044)
29-Jun-2017 14:59 EDT
While credit conditions for borrowers in the U.S. and Canada remain broadly favorable, S&P Global Ratings sees some pockets of pressure building--beyond the U.S. federal policy proposals and prospects for rising benchmark interest rates we've recentl...

Credit Conditions: Borrowers In The U.S. And Canada Are Enjoying Favorable Conditions, But Risks Are Growing (/en_US/web/guest/article/-/view/type/HTML/id/1829572)
04-Apr-2017 10:48 EDT
Borrowers in North America continue to enjoy broadly favorable credit conditions, with the U.S. economic expansion showing no signs of ceasing. However, notable pressures are building--with son on the upside, we should note--related to U.S. federal...

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The following premium research is available from RatingsDirect - the real-time, Web-based source for Standard & Poor's global credit ratings, research, and risk analysis.

Can Small Modular Reactors Re-energize The U.S. Nuclear Industry?
13-Sep-2017 15:13 EDT
The U.S. nuclear industry has experienced a number of setbacks in recent years. For one thing, the scale and complexity of traditional plants has become a significant barrier to pursuing new project Moreover, recent construction efforts have been p...

Reactions: Nuclear In Q3 2017
13-Sep-2017 12:16 EDT
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Alliant Energy Corp.

Issuer Credit Rating

Rating Type	Rating	Rating Date	Regulatory Identifiers	CreditWatch/ Outlook	CreditWatch/ Outlook Date
Local Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/320994/coreRatingId/634306113)	11-Jan-2013	EE	Stable	11-Jan-2013
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/320994/coreRatingId/634305955)	17-Oct-2001	EE		
Foreign Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/320994/coreRatingId/634304960)	11-Jan-2013	EE	Stable	11-Jan-2013
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/320994/coreRatingId/634305597)	17-Oct-2001	EE		

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Ameren Corp.

Issuer Credit Rating

Rating Type	Rating	Rating Date	Regulatory Identifiers	CreditWatch/ Outlook	CreditWatch/ Outlook Date
Local Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/319785/coreRatingId/627221266)	04-Dec-2013	EE	Stable	04-Dec-2013
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/319785/coreRatingId/627221263)	14-Mar-2013	EE		
Foreign Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/319785/coreRatingId/627221264)	04-Dec-2013	EE	Stable	04-Dec-2013
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/319785/coreRatingId/627221262)	14-Mar-2013	EE		

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Southern Co.

Issuer Credit Rating

Rating Type	Rating	Rating Date	Regulatory Identifiers	CreditWatch/ Outlook	CreditWatch/ Outlook Date
Local Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109366/coreRatingId/890471895)	17-Aug-2015	EE	Negative	24-Mar-2017
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109366/coreRatingId/890471894)	17-Aug-2015	EE		
Foreign Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109366/coreRatingId/890471892)	17-Aug-2015	EE	Negative	24-Mar-2017
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109366/coreRatingId/890471891)	17-Aug-2015	EE		

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04-Aug-2017 16:47 EDT
We have reviewed U.S.-based Southern Co.'s business and financial risk profiles in light of the company's decision to impair the majority of investment at the Kemper integrated gasification combine cycle project and the uncertainty of how the compan...

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Legend has it that when picking a design for the cover of "American Beauty", the 1970 music album by the Grateful Dead, the band's co-founder, Jerry Garcia, chose an ambigram--a typographical design that lets a reader discern more than one word in th...

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Issuer Credit Rating

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Local Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109373/coreRatingId/890270495)	12-Oct-2001	EE	Stable	26-Jan-2005
Foreign Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109373/coreRatingId/890270493)	12-Oct-2001	EE	Stable	26-Jan-2005

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Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/331433/coreRatingId/890821355)	17-Apr-2002	EE		
Foreign Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/331433/coreRatingId/890821353)	07-Oct-2003	EE	Stable	02-Oct-2009
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/331433/coreRatingId/890821350)	17-Apr-2002	EE		

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21-Sep-2017 09:56 EDT
NEW YORK (S&P Global Ratings) Sept. 21, 2017--S&P Global Ratings today published its revised criteria for rating debt issues of investment-grade and some speculative-grade corporate issuers (see "Reflecting Subordination Risk In Corporate Issue Ratin...

Sempra Energy And Its Utility Subsidiaries Ratings Affirmed On EFHC Acquisition Agreement; Outlook Stable (/en_US/web/guest/article/-/view/type/HTML/id/1903892)
21-Aug-2017 16:36 EDT
Sempra Energy announced an agreement, subject to bankruptcy court approval, to acquire the common equity of Energy Future Holdings Corp. (EFHC) for $9.45 billion. We are affirming the ratings o Sempra Energy, including our 'BBB+' issuer credit ratin...

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Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/107510/coreRatingId/890442648)	06-Oct-2010	EE		
Foreign Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/107510/coreRatingId/890442645)	22-Apr-2009	EE	Developing	03-Aug-2017
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/107510/coreRatingId/890442647)	06-Oct-2010	EE		

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SCANA Corp. And Subsidiaries Outlook To Developing On Plan To Abandon Construction Of Nuclear Plants; Ratings Affirmed (/en_US/web/guest/article/-/view/type/HTML/id/1894988)
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South Carolina Electric & Gas Co., SCANA Corp.'s largest operating subsidiary, has announced plans to abandon construction of the nuclear plants it is currently building and has filed for recovery of the abandoned investment with the South Carolina P...

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Public Service Enterprise Group Inc.

Issuer Credit Rating

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Local Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109364/coreRatingId/884336089)	23-Apr-2013	EE	Stable	05-May-2015
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Public Service Enterprise Group Inc. And Subsidiary Ratings Affirmed; Outlook Stable (/en_US/web/guest/article/-/view/type/HTML/id/1840047)
27-Apr-2017 16:37 EDT
We expect utility holding company Public Service Enterprise Group Inc.'s (PSEG) financial performance will weaken somewhat over the next few years, mainly as a result of ongoing softness in wholes power prices. We now expect PSEG's financial perfo...

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Eversource Energy

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Local Currency ST	A-1Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109359/coreRatingId/884338988)	23-Apr-2015	EE		
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Aquarion Co. Ratings Placed On CreditWatch Positive On Announced Acquisition By Eversource Energy (/en_US/web/guest/article/-/view/type/HTML/id/1861913)
02-Jun-2017 16:46 EDT
Eversource Energy agreed to acquire Aquarion Co. subsidiary Aquarion Water Co. for an enterprise value of $1.675 billion, to be funded with $880 million in cash and $795 million of assumed debt. We are placing the 'BBB' issuer credit rating and 'BBB-...

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Duke Energy Corp.

Issuer Credit Rating

Rating Type	Rating	Rating Date	Regulatory Identifiers	CreditWatch/ Outlook	CreditWatch/ Outloo Date
Local Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100702/coreRatingId/884863396)	02-Apr-2015	EE	Stable	12-Jan-2017
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100702/coreRatingId/884863395)	26-Sep-2008	EE		
Foreign Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100702/coreRatingId/884863398)	02-Apr-2015	EE	Stable	12-Jan-2017
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100702/coreRatingId/884863400)	26-Sep-2008	EE		

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Piedmont Natural Gas Co. Inc. Short-Term And Commercial Paper Ratings Withdrawn (/en_US/web/guest/article/-/view/type/HTML/id/1871278)
20-Jun-2017 13:50 EDT
NEW YORK (S&P Global Ratings) June 20, 2017--S&P Global Ratings today withdrew its 'A-2' short-term rating on Piedmont Natural Gas Co. Inc. following the company's termination of its commercia paper program. The 'A-' issuer credit rating is affirmed...

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Reactions: Nuclear In Q3 2017
13-Sep-2017 12:16 EDT
In April 2017, the U.S. Department of Energy, under Energy Secretary Rick Perry, announced its so-called 60-Day Study. At the time, the development was a bit unexpected. The Trump Campaign ha extolled the virtues of a more deregulated energy market ...

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Issuer Credit Rating

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Local Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109357/coreRatingId/887318070)	11-Mar-2010	EE	Stable	11-Mar-2010
Foreign Currency LT	A-Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/109357/coreRatingId/887318068)	11-Mar-2010	EE	Stable	11-Mar-2010

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NextEra Energy Inc. And Subsidiaries 'A-' Ratings Affirmed On Subsidiary Governance Changes (/en_US/web/guest/article/-/view/type/HTML/id/1873949)
23-Jun-2017 14:34 EDT
NextEra Energy Inc. (NextEra) is planning to implement various governance changes at its subsidiary NextEra Energy Partners L.P. (NEP) (BB/Stable/--) that will lead to a loss of control of NEP. We expect that the loss of control will not affect its credit...

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Local Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/110259/coreRatingId/582679258)	03-Dec-2014	EE	Stable	03-Dec-2014
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/110259/coreRatingId/582679254)	18-Mar-2013	EE		
Foreign Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/110259/coreRatingId/582679255)	03-Dec-2014	EE	Stable	03-Dec-2014
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/110259/coreRatingId/582679257)	18-Mar-2013	EE		

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04-Apr-2017 10:48 EDT
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Local Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100681/coreRatingId/882889506)	01-Feb-2016	EE	Stable	01-Feb-2016
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100681/coreRatingId/882889505)	18-Nov-1991	EE		
Foreign Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100681/coreRatingId/882889503)	01-Feb-2016	EE	Stable	01-Feb-2016
Foreign Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/100681/coreRatingId/882889502)	18-Nov-1991	EE		

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Dominion Energy Inc.'s $1 Billion Junior Subordinated Notes Rated 'BBB' (/en_US/web/guest/article/-/view/type/HTML/id/1848420)
12-May-2017 15:42 EDT
NEW YORK (S&P Global Ratings) May 12, 2017--S&P Global Ratings today assigned its 'BBB' issue rating to Dominion Energy Inc.'s remarketed $1 billion junior subordinated notes due 2020 based on our review of the proposed terms and conditions. Dominion...

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Local Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/304105/coreRatingId/890958604)	09-Dec-2010	EE	Stable	21-Aug-2015
Local Currency ST	A-2Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/304105/coreRatingId/890958609)	15-Jan-2010	EE		
Foreign Currency LT	BBB+Regulatory Disclosures (/en_US/web/guest/ratings/pcr/-/pcr-details/coreOrgId/304105/coreRatingId/890958607)	09-Dec-2010	EE	Stable	21-Aug-2015
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Exhibit 7.8: Size-Decile Portfolios of the NYSE/NYSE MKT/NASDAQ Long-Term Returns in Excess of CAPM
1926–2016

Size Grouping	OLS Beta	Arithmetic Mean	Return in Excess of Risk-free Rate (actual)	Return in Excess of Risk-free Rate (as predicted by CAPM)	Size Premium
Mid-Cap (3–5)	1.12	13.82%	8.80%	7.79%	1.02%
Low-Cap (6–8)	1.22	15.26%	10.24%	8.49%	1.75%
Micro-Cap (9–10)	1.35	18.04%	13.02%	9.35%	3.67%
Breakdown of Deciles 1–10					
1-Largest	0.92	11.05%	6.04%	6.38%	-0.35%
2	1.04	12.82%	7.81%	7.19%	0.61%
3	1.11	13.57%	8.55%	7.66%	0.89%
4	1.13	13.80%	8.78%	7.80%	0.98%
5	1.17	14.62%	9.60%	8.09%	1.51%
6	1.17	14.81%	9.79%	8.14%	1.66%
7	1.25	15.41%	10.39%	8.67%	1.72%
8	1.30	16.14%	11.12%	9.04%	2.08%
9	1.34	16.97%	11.96%	9.28%	2.68%
10-Smallest	1.39	20.27%	15.25%	9.66%	5.59%

Betas are estimated from monthly returns in excess of the 30-day U.S. Treasury bill total return, January 1926–December 2016. Historical riskless rate measured by the 91-year arithmetic mean income return component of 20-year government bonds (5.02%). Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the S&P 500 (11.95%) minus the arithmetic mean income return component of 20-year government bonds (5.02%) from 1926–2016. Source: Morningstar *Direct* and CRSP. Calculated based on data from CRSP US Stock Database and CRSP US Indices Database ©2017 Center for Research. Used with permission. All calculations performed by Duff & Phelps, LLC.

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2017 SBBI Yearbook

Stocks, Bonds, Bills, and Inflation

U.S. Capital Markets Performance by Asset Class 1926–2016

Duff & Phelps

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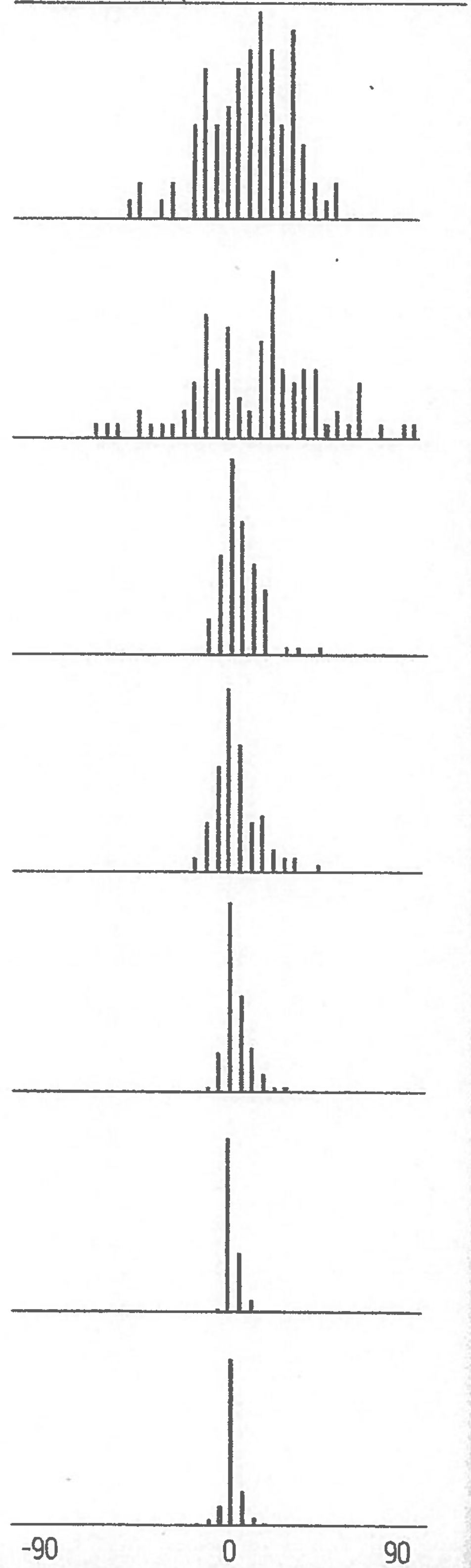
Exhibit 2.3: Basic Series, Summary Statistics of Annual Total Returns (%)
1926–2016

Series	Geometric Mean (%)	Arithmetic Mean (%)	Standard Deviation (%)	Distribution (%)
Large-Cap Stocks	10.0	12.0	19.9	
Small-Cap Stocks*	12.1	16.6	31.9	
Long-term Corp Bonds	6.0	6.3	8.4	
Long-term Gov't Bonds	5.5	6.0	9.9	
Inter-term Gov't Bonds	5.1	5.3	5.6	
U.S. Treasury Bills	3.4	3.4	3.1	
Inflation	2.9	3.0	4.1	



*The 1933 small-cap stocks total return was 142.9%, and is not shown here.

Basic Series Summary Statistics

Exhibit 6.9 presents summary statistics of annual total return, and where applicable, income and capital appreciation, for each asset class. The summary statistics presented here are arithmetic mean, geometric mean, standard deviation, and serial correlation. Exhibit 6.10 presents summary statistics for the six inflation-adjusted total return series.

Exhibit 6.9: Total Returns, Income Returns, and Capital Appreciation Returns of the SBBI Asset Classes Summary Statistics of Annual Returns (%)
1926–2016

	Geometric Mean (%)	Arithmetic Mean (%)	Standard Deviation (%)	Serial Correlation
Large-Cap Stocks				
Total Return	10.0	12.0	19.9	0.02
Income	4.0	4.0	1.6	0.91
Capital Appreciation	5.8	7.7	19.2	0.01
Small-Cap Stocks (TR)	12.1	16.6	31.9	0.06
Long-term Corp Bonds (TR)	6.0	6.3	8.4	0.04
Long-term Gov't Bonds				
Total Return	5.5	6.0	9.9	-0.15
Income	5.0	5.0	2.6	0.96
Capital Appreciation	0.3	0.7	8.9	-0.26
Inter-term Gov't Bonds				
Total Return	5.1	5.3	5.6	0.14
Income	4.4	4.4	2.9	0.96
Capital Appreciation	0.6	0.7	4.5	-0.17
U.S. Treasury Bills (TR)	3.4	3.4	3.1	0.92
Inflation	2.9	3.0	4.1	0.64

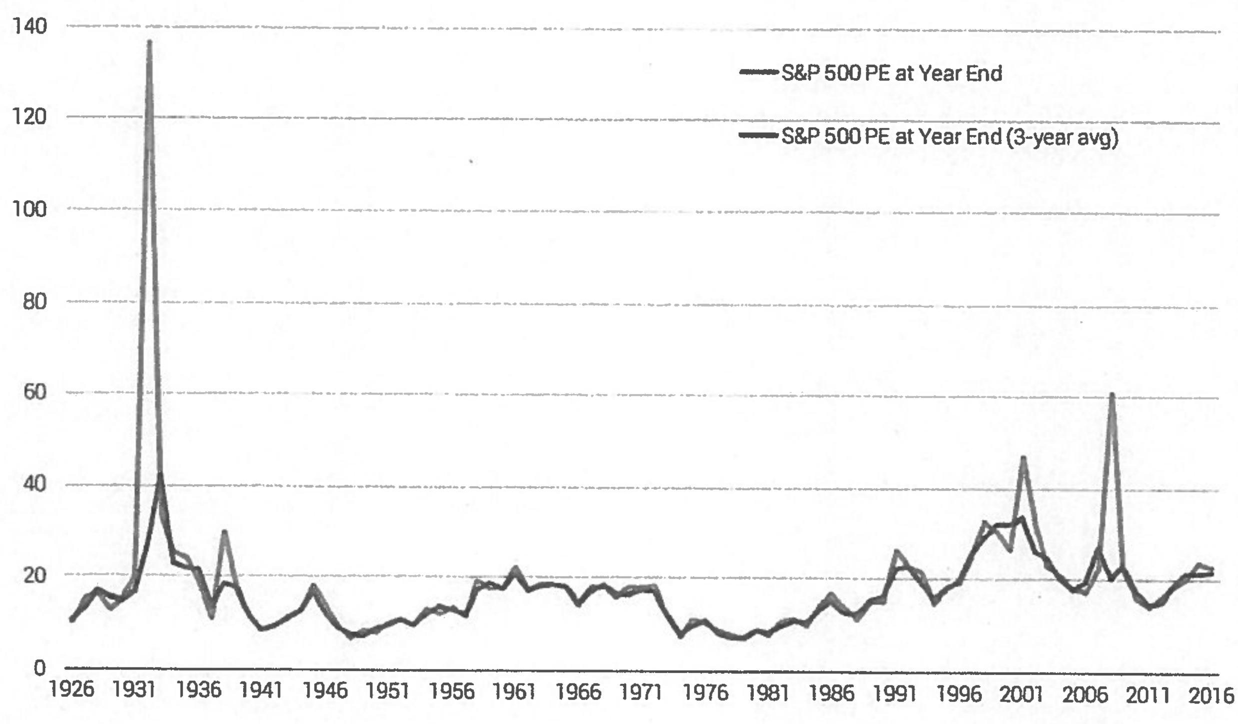
Exhibit 6.9 shows that over 1926–2016 small-cap stocks were the riskiest asset class with a standard deviation of 31.9%, but provided the greatest rewards to long-term investors, with an arithmetic mean annual return of 16.6%. The geometric mean of the small-cap series is 12.1%. Large-cap stocks, long-term government bonds, long-term corporate bonds, and intermediate-term government bonds are progressively less risky, and have lower average returns. Treasury bills were nearly riskless and had the lowest return. In general, risk is rewarded by a higher return over the long term.

Forward-Looking Earnings Model

Ibbotson and Chen forecast the equity risk premium through a supply-side model using historical data. They used an earnings model as the basis for their supply-side estimate. The earnings model breaks the historical equity return into four pieces, with only three historically being supplied by companies: inflation, income return, and growth in real earnings per share. The growth in the P/E ratio, the fourth piece, is a reflection of investors' changing prediction of future earnings growth. The past supply of corporate growth is forecasted to continue; however, a change in investors' predictions is not. P/E rose dramatically from 1980 through 2001 because people believed that corporate earnings were going to grow faster in the future. This growth in P/E drove a small portion of the rise in equity returns over the same period.

Exhibit 10.14 illustrates the price-to-earnings ratio from 1926 to 2016. The P/E ratio, using one year average earnings, was 10.23 at the beginning of 1926 and ended the year 2016 at 22.56, an average increase of 0.87% per year. The highest P/E was 136.69 recorded in 1932, while the lowest was 7.08 recorded in 1948. Ibbotson Associates revised the calculation of the P/E ratio from a one-year to a three-year average earnings for use in equity forecasting.

Exhibit 10.14: Large-cap Stocks P/E Ratio
1926–2016



This is because reported earnings are affected not only by the long-term productivity, but also by one-time items that do not necessarily have the same consistent impact year after year. The three year average is more reflective of the long-term trend than the year-by-year numbers. The P/E ratio calculated using the three-year average of earnings had an increase of 0.79% per year.

The historical P/E growth factor, using three-year earnings, of 0.79% per year is subtracted from the equity forecast because it is not believed that P/E will continue to increase in the future. The market serves as the cue. The current P/E ratio is the market's best guess for the future of corporate earnings and there is no reason to believe, at this time, that the market will change its mind. Using this top-down approach, the geometric supply-side equity risk premium is 3.99%, which equates to an arithmetic supply-side equity risk premium of 5.97%.

Another approach in calculating the premium would be to add up the components that constitute the supply of equity return, excluding the P/E component. Thus, the supply of equity return only includes inflation, the growth in real earnings per share, and income return. This forward-looking earnings model calculates the long-term supply of U.S. equity returns to be 9.21%:

$$SR = \left[(1+CPI)\times(1+g_{REPS}) - Inc + Rinv\right]$$

$$9.21\%^{*} = \left[(1+2.90\%)\times(1+2.05\%)-1\right] + 3.98\% + 0.21\%$$

* difference due to rounding

Where:

SR	=	The supply of the equity return
CPI	=	Consumer Price Index (inflation)
g_{REPS}	=	The growth in real earning per share
Inc	=	The income return
Rinv	=	The reinvestment return

The equity risk premium, based on the supply-side earnings model, is calculated to be 3.99% on a geometric basis:

$$SERP = \frac{(1+SR)}{(1+CPI)\times(1+RRf)} - 1$$

$$3.99\%^{*} = \frac{1+9.21\%}{(1+2.90\%)\times(1+2.03\%)} - 1$$

* difference due to rounding

Where:

SERP	=	The supply-side equity risk premium
SR	=	The supply of the equity return
CPI	=	Consumer Price Index (inflation)
RRf	=	The real risk-free rate

Converting the geometric average into an arithmetic average results in an equity risk premium of 5.97%:[10.10]

$$R_A = R_G + \frac{\sigma^2}{2}$$

$$5.97\%^* = 3.99\% + \frac{19.88\%^2}{2}$$

* difference due to rounding

Where:

R_A	=	The arithmetic average
R_G	=	The geometric average
σ	=	The standard deviation of equity returns

Exhibit 10.15 presents the supply-side equity risk premium, on an arithmetic basis, beginning in 1926 and ending in each of the years from 2003 through 2016.[10.11]

10.10 The 1926–2016 supply-side equity risk premia estimate (5.97%) is calculated by Duff & Phelps for the *2017 SBBI Yearbook* using (i) the same methodologies and (ii) the same data sources as were used in previous editions of this book.

10.11 In last year's *2016 SBBI Yearbook*, Exhibit 10.15 included supply-side ERP estimates for the most recent 25 years, estimated using *refreshed* data inputs over the entire 1926–2015 time horizon. Starting with the *2017 SBBI Yearbook* (this book), this exhibit will only include the years for which supply-side ERP values were actually published in a hardcover book (instead of the most recent 25 years). As such, this exhibit will be made to match (i) the "as published" supply-side ERP values from the *2004–2013 SBBI Valuation Yearbooks* (see "Appendix C-1" in those books), and (ii) the "as published" values from the 2014 (and subsequent years) *Valuation Handbook – U.S. Guide to Cost of Capital* (see "Appendix 3" in those books).

KWalton

AEE Ameren Corporation - Detailed Estimates - Zacks.c
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Ameren Corporation (AEE)

(Real Time Quote from BATS)

$59.46 USD

-1.05 (-1.74%)

Updated Sep 12, 2017 03:58 PM ET

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Zacks Rank: 3-Hold 3

Style Scores: C Value | C Growth | D Momentum | C VGM

Industry Rank: Bottom 38%(164 out of 265)

Industry: Utility - Electric Power

Ameren Corporation (AEE) Quote Overview » Estimates » Ameren Corporation (AEE) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/3/17	Earnings ESP	0.00%
Current Quarter	1.38	Current Year	2.80
EPS Last Quarter	0.69	Next Year	3.02
Last EPS Surprise	14.49%	EPS (TTM)	2.86
ABR	2.25	P/E (F1)	21.74

Growth Estimates	AEE	IND	S&P
Current Qtr (09/2017)	-9.21	NA	NA
Next Qtr (12/2017)	65.38	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.03
Past 5 Years	0.80	1.70	2.80
Next 5 Years	6.50	6.50	NA
PE	21.74	15.40	888.07
PEG Ratio	3.34	2.37	NA

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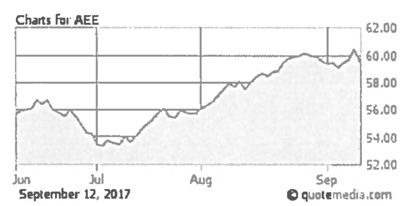
Research for AEE

Chart for AEE



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Premium Research for AEE

Zacks Rank	▼ Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

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	Wednesday	In a Week	In a Month	In 3 Months
AEE Ameren Corporat...				

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Options Greek Montage

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C Value | C Growth | D Momentum | C VGM

Earnings ESP	0.00%
Research Reports for AEE	Analyst | Snapshot

(= Change in last 30 days)

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	6.34B	6.53B
# of Estimates	NA	NA	1	1
High Estimate	NA	NA	6.34B	6.53B
Low Estimate	NA	NA	6.34B	6.53B
Year ago Sales	1.86B	1.36B	6.08B	6.34B
Year over Year Growth Est.	NA	NA	4.32%	3.02%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.38	0.22	2.80	3.02
# of Estimates	2	2	6	6
Most Recent Consensus	1.47	0.12	2.80	3.00
High Estimate	1.47	0.31	2.81	3.05
Low Estimate	1.29	0.12	2.80	3.00
Year ago EPS	1.52	0.13	2.68	2.80
Year over Year Growth Est.	-9.21%	65.38%	4.54%	7.61%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	0	1	5	3
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	2	1	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.38	0.22	2.80	3.02
7 Days Ago	1.38	0.22	2.80	3.02
30 Days Ago	1.38	0.22	2.80	3.02
60 Days Ago	1.51	0.19	2.77	3.01
90 Days Ago	1.51	0.20	2.77	3.00

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.38	0.22	2.80	3.00
Zacks Consensus Estimate	1.38	0.22	2.80	3.02
Earnings ESP	0.00%	0.00%	-0.06%	-0.50%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.79	0.42	0.13	1.52	NA
Estimate	0.69	0.42	0.15	1.38	NA
Difference	0.10	0.00	-0.02	0.14	0.06
Surprise	14.49%	0.00%	-13.33%	10.14%	2.83%

Annual Estimates By Analyst

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AEP American Electric Power Company, Inc. - Detailed E
10/25/17 12:52 PM

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American Electric Power Company, Inc. (AEP)
(Real Time Quote from BATS)

$73.12 USD
-1.47 (-1.97%)
Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank: 3-Hold 3
Style Scores: C Value | F Growth | F Momentum | F VGM
Industry Rank: Bottom 38%(164 out of 265)
Industry: Utility - Electric Power

American Electric Power Company, Inc. (AEP) Quote Overview » Estimates » American Electric Power Company, Inc. (AEP) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/7/17	Earnings ESP	-2.54%
Current Quarter	1.26	Current Year	3.65
EPS Last Quarter	0.82	Next Year	3.89
Last EPS Surprise	-8.54%	EPS (TTM)	3.68
ABR	2.17	P/E (F1)	20.41

Growth Estimates	AEP	IND	S&P
Current Qtr (09/2017)	-2.92	NA	NA
Next Qtr (12/2017)	-4.78	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.03
Past 5 Years	5.00	1.70	2.80
Next 5 Years	5.40	6.50	NA
PE	20.41	15.40	681.21
PEG Ratio	3.80	2.37	NA

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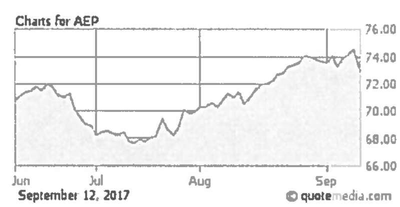
Research for AEP

Chart for AEP



Interactive Chart | Fundamental Charts

Premium Research for AEP

Zacks Rank	Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)

Options Greek Montage

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Style Scores C Value | F Growth | F Momentum | F VGM

Earnings ESP	-2.54%
Research Reports for AEP	Analyst | Snapshot

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	Wednesday	In a Week	In a Month	In 3 Months
AEP American Electr...				

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Sales Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	4.22B	3.53B	15.21B	15.41B
# of Estimates	1	1	5	5
High Estimate .	4.22B	3.53B	15.94B	16.23B
Low Estimate	4.22B	3.53B	14.14B	14.36B
Year ago Sales	4.65B	3.80B	16.35B	15.21B
Year over Year Growth Est.	-9.33%	-7.22%	-6.96%	1.32%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.26	0.64	3.65	3.89
# of Estimates	5	5	8	9
Most Recent Consensus	1.30	0.59	3.64	3.88
High Estimate	1.30	0.68	3.70	3.94
Low Estimate	1.17	0.59	3.60	3.83
Year ago EPS	1.30	0.67	3.93	3.65
Year over Year Growth Est.	-2.92%	-4.78%	-7.06%	6.47%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	1	0	1
Up Last 30 Days	1	2	0	1
Up Last 60 Days	3	4	1	1
Down Last 7 Days	1	0	1	0
Down Last 30 Days	1	0	2	0
Down Last 60 Days	1	0	1	1

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.26	0.64	3.65	3.89
7 Days Ago	1.26	0.64	3.65	3.89
30 Days Ago	1.26	0.62	3.66	3.89
60 Days Ago	1.21	0.59	3.65	3.88
90 Days Ago	1.21	0.59	3.65	3.89

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.23	0.64	3.67	3.89
Zacks Consensus Estimate	1.26	0.64	3.65	3.89
Earnings ESP	-2.54%	-0.47%	0.34%	0.03%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.75	0.96	0.67	1.30	NA
Estimate	0.82	0.97	0.55	1.21	NA
Difference	-0.07	-0.01	0.12	0.09	0.03
Surprise	-8.54%	-1.03%	21.82%	7.44%	4.92%

Quarterly Estimates By Analyst

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Real time prices by BATS. Delayed quotes by Sungard.

NYSE and AMEX data is at least 20 minutes delayed. NASDAQ data is at least 15 minutes delayed.

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Fortis Inc. (FTS)

(Real Time Quote from BATS)

$36.97 USD

-0.55 (-1.47%)

Updated Sep 12, 2017 03:58 PM ET

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Zacks Rank:
1-Strong Buy 1

Style Scores:
D Value | F Growth | D Momentum | F VGM

Industry Rank:
Bottom 38%(164 out of 265)

~~Industry: Utility - Electric Power~~

Fortis Inc. (FTS) Quote Overview » Estimates » Fortis Inc. (FTS) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/3/17	Earnings ESP	0.00%
Current Quarter	0.45	Current Year	1.95
EPS Last Quarter	0.41	Next Year	2.03
Last EPS Surprise	9.76%	EPS (TTM)	1.87
ABR	2.00	P/E (F1)	19.23

Growth Estimates	FTS	IND	S&P
Current Qtr (09/2017)	9.76	NA	NA
Next Qtr (12/2017)	2.08	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.05
Past 5 Years	NA	1.70	2.80
Next 5 Years	5.50	6.50	NA
PE	19.23	15.40	1,275.95
PEG Ratio	3.50	2.37	NA

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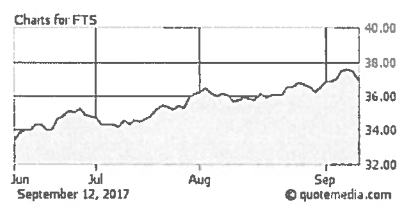
Research for FTS

Chart for FTS



Interactive Chart | Fundamental Charts

Premium Research for FTS

Zacks Rank	**Strong Buy** 1
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

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	Wednesday	In a Week	In a Month	In 3 Months
FTS Fortis Inc				

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Options Greek Montage

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D Value | F Growth | D Momentum | F VGM

Earnings ESP	0.00%
Research Report for FTS	Snapshot

(= Change in last 30 days)

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	6.30B	6.39B
# of Estimates	NA	NA	2	2
High Estimate	NA	NA	6.47B	6.50B
Low Estimate	NA	NA	6.12B	6.27B
Year ago Sales	1.16B	1.54B	5.12B	6.30B
Year over Year Growth Est.	NA	NA	22.93%	1.42%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	0.45	0.49	1.95	2.03
# of Estimates	1	1	4	4
Most Recent Consensus	0.45	0.49	2.02	2.11
High Estimate	0.45	0.49	2.05	2.12
Low Estimate	0.45	0.49	1.80	1.82
Year ago EPS	0.41	0.48	1.76	1.95
Year over Year Growth Est.	9.76%	2.08%	10.80%	3.97%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	1	1	3	3
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	0	0	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	0.45	0.49	1.95	2.03
7 Days Ago	0.45	0.49	1.95	2.03
30 Days Ago	0.45	0.49	1.95	2.03
60 Days Ago	0.46	0.50	1.85	1.93
90 Days Ago	0.44	0.47	1.82	1.89

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.45	0.49	1.88	1.95
Zacks Consensus Estimate	0.45	0.49	1.95	2.03
Earnings ESP	0.00%	0.00%	-3.59%	-3.82%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.45	0.53	0.48	0.41	NA
Estimate	0.41	0.57	0.36	0.38	NA
Difference	0.04	-0.04	0.12	0.03	0.04
Surprise	9.76%	-7.02%	33.33%	7.89%	10.99%

Quarterly Estimates By Analyst

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Eversource Energy (ES)

(Real Time Quote from BATS)

$62.66 USD

-1.49 (-2.32%)

Updated Sep 12, 2017 03:58 PM ET

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Zacks Rank:
3-Hold 3
Style Scores:
C Value | D Growth | C Momentum | D VGM
Industry Rank:
Bottom 38%(164 out of 265)
Industry: Utility - Electric Power

Eversource Energy (ES) Quote Overview » Estimates » Eversource Energy (ES) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/7/17	Earnings ESP	0.31%
Current Quarter	0.86	Current Year	3.17
EPS Last Quarter	0.68	Next Year	3.33
Last EPS Surprise	5.88%	EPS (TTM)	3.09
ABR	2.13	P/E (F1)	20.22

Growth Estimates	ES	IND	S&P
Current Qtr (09/2017)	4.10	NA	NA
Next Qtr (12/2017)	8.06	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.03
Past 5 Years	5.30	1.70	2.80
Next 5 Years	6.00	6.50	NA
PE	20.22	15.40	784.57
PEG Ratio	3.37	2.37	NA

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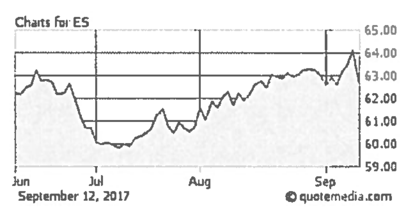
Research for ES

Chart for ES



Interactive Chart | Fundamental Charts

Premium Research for ES

Zacks Rank	**Hold** 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
ES Eversource Ener...				

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Options Greek Montage

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Earnings ESP	0.31%
Research Reports for ES	Analyst | Snapshot

(= Change in last 30 days)

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Sales Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	2.12B	1.84B	7.86B	8.14B
# of Estimates	1	1	5	5
High Estimate	2.12B	1.84B	8.30B	8.45B
Low Estimate	2.12B	1.84B	7.68B	7.98B
Year ago Sales	2.04B	1.78B	7.64B	7.86B
Year over Year Growth Est.	3.84%	3.62%	2.89%	3.61%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	0.86	0.78	3.17	3.33
# of Estimates	5	5	8	8
Most Recent Consensus	0.84	0.77	3.20	3.35
High Estimate	0.88	0.85	3.20	3.35
Low Estimate	0.84	0.71	3.14	3.27
Year ago EPS	0.83	0.72	2.96	3.17
Year over Year Growth Est.	4.10%	8.06%	7.14%	5.12%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	1	0
Up Last 30 Days	0	0	1	0
Up Last 60 Days	1	1	3	1
Down Last 7 Days	1	1	0	1
Down Last 30 Days	1	1	0	1
Down Last 60 Days	1	2	1	3

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	0.86	0.78	3.17	3.33
7 Days Ago	0.87	0.78	3.17	3.34
30 Days Ago	0.87	0.78	3.17	3.34
60 Days Ago	0.87	0.79	3.16	3.34
90 Days Ago	0.87	0.77	3.16	3.34

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.87	0.78	3.17	3.33
Zacks Consensus Estimate	0.86	0.78	3.17	3.33
Earnings ESP	0.31%	0.26%	-0.12%	-0.11%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.72	0.82	0.72	0.83	NA
Estimate	0.68	0.83	0.75	0.80	NA
Difference	0.04	-0.01	-0.03	0.03	0.01
Surprise	5.88%	-1.20%	-4.00%	3.75%	1.11%

Quarterly Estimates By Analyst

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DUK Duke Energy Corporation - Detailed Estimates - Zc
10/25/17 12:52 PM

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Duke Energy Corporation (DUK)

(Real Time Quote from BATS)

$87.27 USD

-1.09 (-1.23%)

Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank: 3-Hold 3

Style Scores: C Value | F Growth | D Momentum | F VGM

Industry Rank: Bottom 38%(164 out of 265)

Industry: Utility - Electric Power

Duke Energy Corporation (DUK) Quote Overview » Estimates » Duke Energy Corporation (DUK) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/3/17	Earnings ESP	0.00%
Current Quarter	1.62	Current Year	4.60
EPS Last Quarter	1.02	Next Year	4.83
Last EPS Surprise	-0.98%	EPS (TTM)	4.54
ABR	3.00	P/E (F1)	19.23

Growth Estimates	DUK	IND	S&P
Current Qtr (09/2017)	-3.57	NA	NA
Next Qtr (12/2017)	11.52	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.02
Past 5 Years	1.60	1.70	2.80
Next 5 Years	4.00	6.50	NA
PE	19.23	15.40	541.48
PEG Ratio	4.81	2.37	NA

Learn More About Estimate Research

See Brokerage Recommendations

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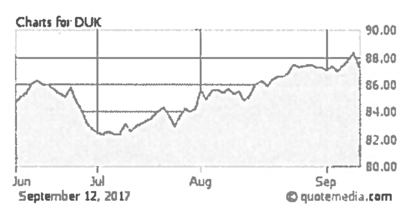
Research for DUK

Chart for DUK



Interactive Chart | Fundamental Charts

Premium Research for DUK

Zacks Rank	Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
DUK Duke Energy Cor...				

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Earnings ESP	0.00%
Research Reports for DUK	Analyst | Snapshot

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	24.00B	24.73B
# of Estimates	NA	NA	5	5
High Estimate	NA	NA	24.53B	25.28B
Low Estimate	NA	NA	23.71B	24.46B
Year ago Sales	6.82B	5.62B	23.55B	24.00B
Year over Year Growth Est.	NA	NA	1.89%	3.06%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.62	0.90	4.60	4.83
# of Estimates	3	3	8	8
Most Recent Consensus	1.73	0.83	4.61	4.85
High Estimate	1.73	0.98	4.65	4.85
Low Estimate	1.50	0.83	4.54	4.80
Year ago EPS	1.68	0.81	4.69	4.60
Year over Year Growth Est.	-3.57%	11.52%	-2.03%	5.01%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	3	2	1	1
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	0	0	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.62	0.90	4.60	4.83
7 Days Ago	1.62	0.90	4.60	4.83
30 Days Ago	1.62	0.90	4.60	4.83
60 Days Ago	1.58	0.89	4.59	4.82
90 Days Ago	1.58	0.89	4.59	4.82

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.62	0.90	4.58	4.83
Zacks Consensus Estimate	1.62	0.90	4.60	4.83
Earnings ESP	0.00%	0.00%	-0.33%	0.00%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	1.01	1.04	0.81	1.68	NA
Estimate	1.02	1.06	0.81	1.56	NA
Difference	-0.01	-0.02	0.00	0.12	0.02
Surprise	-0.98%	-1.89%	0.00%	7.69%	1.21%

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Dominion Energy Inc. (D)

(Real Time Quote from BATS)

$78.20 USD

-1.78 (-2.23%)

Updated Sep 12, 2017 03:58 PM ET

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Zacks Rank: 3-Hold 3

Style Scores: D Value | F Growth | A Momentum | D VGM

Industry Rank: Bottom 38%(164 out of 265)

~~Industry: Utility - Electric Power~~

Dominion Energy Inc. (D) Quote Overview » Estimates » Dominion Energy Inc. (D) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	10/30/17	Earnings ESP	1.89%
Current Quarter	1.06	Current Year	3.64
EPS Last Quarter	0.66	Next Year	4.02
Last EPS Surprise	1.52%	EPS (TTM)	3.77
ABR	2.56	P/E (F1)	21.96

Growth Estimates	D	IND	S&P
Current Qtr (09/2017)	-7.02	NA	NA
Next Qtr (12/2017)	-8.42	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.03
Past 5 Years	3.80	1.70	2.80
Next 5 Years	6.00	6.50	NA
PE	21.96	15.40	683.55
PEG Ratio	3.66	2.37	NA

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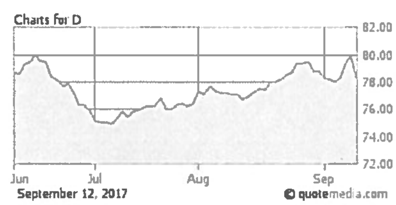
Research for D

Chart for D



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Premium Research for D

Zacks Rank	Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

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D Dominion Energy...				

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Earnings ESP	1.89%
Research Reports for D	Analyst | Snapshot

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Sales Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	3.43B	3.22B	12.64B	13.66B
# of Estimates	1	1	3	3
High Estimate	3.43B	3.22B	12.85B	13.99B
Low Estimate	3.43B	3.22B	12.45B	13.20B
Year ago Sales	3.13B	3.08B	11.73B	12.64B
Year over Year Growth Est.	9.44%	4.61%	7.76%	8.03%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.06	0.91	3.64	4.02
# of Estimates	3	3	7	7
Most Recent Consensus	1.05	0.96	3.65	4.05
High Estimate	1.08	0.96	3.75	4.13
Low Estimate	1.05	0.80	3.54	3.94
Year ago EPS	1.14	0.99	3.80	3.64
Year over Year Growth Est.	-7.02%	-8.42%	-4.21%	10.56%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	1	0	1	1
Up Last 30 Days	1	0	1	1
Up Last 60 Days	1	1	0	1
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	2	2	2	2

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.06	0.91	3.64	4.02
7 Days Ago	1.06	0.91	3.64	4.01
30 Days Ago	1.06	0.91	3.64	4.01
60 Days Ago	1.05	0.93	3.65	4.02
90 Days Ago	1.06	0.93	3.65	4.02

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.08	0.91	3.57	3.97
Zacks Consensus Estimate	1.06	0.91	3.64	4.02
Earnings ESP	1.89%	0.00%	-2.06%	-1.35%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.67	0.97	0.99	1.14	NA
Estimate	0.66	0.96	1.00	1.04	NA
Difference	0.01	0.01	-0.01	0.10	0.03
Surprise	1.52%	1.04%	-1.00%	9.62%	2.80%

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DTE Energy Company (DTE)
(Real Time Quote from BATS)

$111.27 USD

-2.23 (-1.97%)

Updated Sep 12, 2017 03:58 PM ET

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Zacks Rank:
3-Hold 3
Style Scores:
C Value | F Growth | B Momentum | D VGM
Industry Rank:
Bottom 38%(164 out of 265)
~~Industry: Utility - Electric Power~~

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Estimates

Next Report Date	10/25/17	Earnings ESP	0.00%
Current Quarter	1.64	Current Year	5.42
EPS Last Quarter	0.99	Next Year	5.68
Last EPS Surprise	8.08%	EPS (TTM)	5.63
ABR	2.14	P/E (F1)	20.96

Growth Estimates	DTE	IND	S&P
Current Qtr (09/2017)	-16.33	NA	NA
Next Qtr (12/2017)	14.81	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.02
Past 5 Years	7.00	1.70	2.80
Next 5 Years	5.90	6.50	NA
PE	20.96	15.40	459.40
PEG Ratio	3.53	2.37	NA

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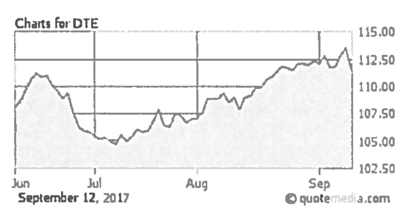
Research for DTE

Chart for DTE



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Premium Research for DTE

Zacks Rank	**Hold** 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
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Earnings ESP	0.00%
Research Reports for DTE	Analyst | Snapshot

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	11.18B	11.35B
# of Estimates	NA	NA	2	2
High Estimate	NA	NA	11.37B	11.64B
Low Estimate	NA	NA	10.99B	11.06B
Year ago Sales	2.93B	2.87B	10.63B	11.18B
Year over Year Growth Est.	NA	NA	5.18%	1.50%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.64	0.93	5.42	5.68
# of Estimates	3	2	5	5
Most Recent Consensus	1.73	0.84	5.43	5.72
High Estimate	1.73	1.02	5.45	5.75
Low Estimate	1.58	0.84	5.35	5.60
Year ago EPS	1.96	0.81	5.28	5.42
Year over Year Growth Est.	-16.33%	14.81%	2.58%	4.95%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	1	0	4	1
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	1	2	0	1

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.64	0.93	5.42	5.68
7 Days Ago	1.64	0.93	5.42	5.68
30 Days Ago	1.64	0.93	5.42	5.68
60 Days Ago	1.65	0.98	5.34	5.68
90 Days Ago	1.65	0.98	5.34	5.68

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.64	0.93	5.42	5.68
Zacks Consensus Estimate	1.64	0.93	5.42	5.68
Earnings ESP	0.00%	0.00%	0.00%	0.00%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	1.07	1.79	0.81	1.96	NA
Estimate	0.99	1.57	0.84	1.54	NA
Difference	0.08	0.22	-0.03	0.42	0.17
Surprise	8.08%	14.01%	-3.57%	27.27%	11.45%

Quarterly Estimates By Analyst

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CMS Energy Corporation (CMS)

(Real Time Quote from BATS)

$48.09 USD

-1.04 (-2.11%)

Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank: 3-Hold 3

Style Scores: C Value | D Growth | D Momentum | D VGM

Industry Rank: Bottom 38%(164 out of 265)

Industry: Utility - Electric Power

CMS Energy Corporation (CMS) Quote Overview » Estimates » CMS Energy Corporation (CMS) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	10/26/17	Earnings ESP	-6.90%
Current Quarter	0.68	Current Year	2.17
EPS Last Quarter	0.41	Next Year	2.33
Last EPS Surprise	-19.51%	EPS (TTM)	2.03
ABR	2.56	P/E (F1)	22.67

Growth Estimates	CMS	IND	S&P
Current Qtr (09/2017)	-3.33	NA	NA
Next Qtr (12/2017)	45.98	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.05
Past 5 Years	6.80	1.70	2.80
Next 5 Years	7.00	6.50	NA
PE	22.67	15.40	1,148.87
PEG Ratio	3.24	2.37	NA

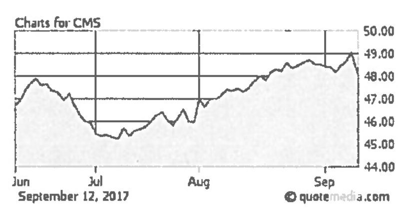
Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Research for CMS

Chart for CMS



Interactive Chart | Fundamental Charts

Premium Research for CMS

Zacks Rank	Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
CMS Cms Energy Corp...				

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Options Greek Montage

Access Zacks Data Feed

C Value | D Growth | D Momentum | D VGM

Earnings ESP	-6.90%
Research Reports for CMS	Analyst | Snapshot

(= Change in last 30 days)

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	6.50B	6.68B
# of Estimates	NA	NA	4	4
High Estimate	NA	NA	6.65B	6.83B
Low Estimate	NA	NA	6.42B	6.55B
Year ago Sales	1.59B	1.64B	6.40B	6.50B
Year over Year Growth Est.	NA	NA	1.65%	2.65%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	0.68	0.42	2.17	2.33
# of Estimates	3	3	7	7
Most Recent Consensus	0.64	0.43	2.17	2.33
High Estimate	0.76	0.48	2.17	2.35
Low Estimate	0.63	0.36	2.15	2.31
Year ago EPS	0.70	0.29	2.02	2.17
Year over Year Growth Est.	-3.33%	45.98%	7.21%	7.72%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	1	2	0	0
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	0	0	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	0.68	0.42	2.17	2.33
7 Days Ago	0.68	0.42	2.17	2.33
30 Days Ago	0.68	0.42	2.17	2.33
60 Days Ago	0.67	0.36	2.17	2.34
90 Days Ago	0.67	0.36	2.17	2.33

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.63	0.48	2.15	2.32
Zacks Consensus Estimate	0.68	0.42	2.17	2.33
Earnings ESP	-6.90%	13.39%	-0.73%	-0.55%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.33	0.71	0.29	0.70	NA
Estimate	0.41	0.65	0.29	0.60	NA
Difference	-0.08	0.06	0.00	0.10	0.02
Surprise	-19.51%	9.23%	0.00%	16.67%	1.60%

Annual Estimates By Analyst

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PEG Public Service Enterprise Group Incorporated - Detc
10/25/17 12:52 PM

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Options

- Option Chain

Public Service Enterprise Group Incorporated (PEG)

(Real Time Quote from BATS)

$45.84 USD

-0.95 (-2.02%)

Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank:
3-Hold 3

Style Scores:
C Value | F Growth | D Momentum | D VGM

Industry Rank:
Bottom 38%(164 out of 265)

~~Industry: Utility - Electric Power~~

Public Service Enterprise Group Incorporated (PEG) Quote Overview » Estimates » Public Service Enterprise Group Incorporated (PEG) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	10/30/17	Earnings ESP	-1.18%
Current Quarter	0.85	Current Year	2.91
EPS Last Quarter	0.57	Next Year	2.94
Last EPS Surprise	8.77%	EPS (TTM)	2.96
ABR	2.14	P/E (F1)	16.09

Growth Estimates	PEG	IND	S&P
Current Qtr (09/2017)	-3.41	NA	NA
Next Qtr (12/2017)	-0.62	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.03
Past 5 Years	0.90	1.70	2.80
Next 5 Years	2.40	6.50	NA
PE	16.09	15.40	856.49
PEG Ratio	6.85	2.37	NA

Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Research for PEG

Chart for PEG

Interactive Chart | Fundamental Charts

Premium Research for PEG

Zacks Rank	Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)

Options Greek Montage

Access Zacks Data Feed

Style Scores C Value | F Growth | D Momentum | D VGM

Earnings ESP	-1.18%
Research Reports for PEG	Analyst | Snapshot

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PEG Public Service ...	Wednesday	In a Week	In a Month	In 3 Months

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	10.13B	10.61B
# of Estimates	NA	NA	4	4
High Estimate	NA	NA	10.90B	11.62B
Low Estimate	NA	NA	9.21B	9.36B
Year ago Sales	2.45B	2.09B	9.06B	10.13B
Year over Year Growth Est.	NA	NA	11.75%	4.79%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	0.85	0.54	2.91	2.94
# of Estimates	3	3	4	5
Most Recent Consensus	0.85	0.50	2.90	3.00
High Estimate	0.86	0.61	2.95	3.00
Low Estimate	0.84	0.50	2.87	2.87
Year ago EPS	0.88	0.54	2.90	2.91
Year over Year Growth Est.	-3.41%	-0.62%	0.17%	1.07%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	0	0	2	2
Down Last 7 Days	1	1	1	0
Down Last 30 Days	1	1	1	0
Down Last 60 Days	3	1	0	1

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	0.85	0.54	2.91	2.94
7 Days Ago	0.85	0.54	2.91	2.94
30 Days Ago	0.85	0.54	2.91	2.94
60 Days Ago	0.88	0.54	2.89	2.92
90 Days Ago	0.89	0.54	2.89	2.93

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.84	0.61	2.90	2.93
Zacks Consensus Estimate	0.85	0.54	2.91	2.94
Earnings ESP	-1.18%	13.66%	-0.17%	-0.20%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.62	0.92	0.54	0.88	NA
Estimate	0.57	0.84	0.52	0.81	NA
Difference	0.05	0.08	0.02	0.07	0.06
Surprise	8.77%	9 52%	3 85%	8.64%	7.70%

Quarterly Estimates By Analyst

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LNT Alliant Energy Corporation - Detailed Estimates - Z
10/25/17 12:52 PM

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Alliant Energy Corporation (LNT)

(Real Time Quote from BATS)

$42.76 USD

-0.86 (-1.97%)

Updated Sep 12, 2017 03:58 PM ET

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Zacks Rank:
3-Hold 3

Style Scores:
D Value | C Growth | D Momentum | D VGM

Industry Rank:
Bottom 38%(164 out of 265)

~~Industry: Utility - Electric Power~~

Alliant Energy Corporation (LNT) Quote Overview » Estimates » Alliant Energy Corporation (LNT) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/2/17	Earnings ESP	0.00%
Current Quarter	0.86	Current Year	2.00
EPS Last Quarter	0.39	Next Year	2.13
Last EPS Surprise	5.13%	EPS (TTM)	1.92
ABR	2.50	P/E (F1)	21.78

Growth Estimates	LNT	IND	S&P
Current Qtr (09/2017)	6.88	NA	NA
Next Qtr (12/2017)	8.93	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.05
Past 5 Years	5.70	1.70	2.80
Next 5 Years	5.50	6.50	NA
PE	21.78	15.40	1,242.81
PEG Ratio	3.96	2.37	NA

Learn More About Estimate Research

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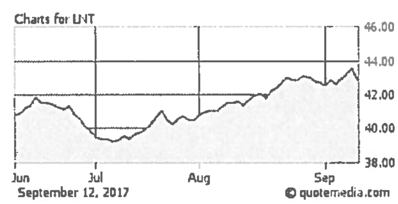
See Earnings Report Transcript

Research for LNT

Chart for LNT



Interactive Chart | Fundamental Charts

Premium Research for LNT

Zacks Rank	Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

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	Wednesday	In a Week	In a Month	In 3 Months
LNT Alliant Energy ...				

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Options Greek Montage

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Earnings ESP	0.00%
Research Reports for LNT	Analyst | Snapshot

(= Change in last 30 days)

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (ND)	Next Year (ND)
Zacks Consensus Estimate	M	NA	M	M
# of Estimates	NA	NA	NA	NA
High Estimate	NA	NA	NA	NA
Low Estimate	NA	NA	NA	NA
Year ago Sales	924.60M	797.00M	3.32B	NA
Year over Year Growth Est.	NA	NA	NA	NA

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	0.86	0.31	2.00	2.13
# of Estimates	2	2	5	5
Most Recent Consensus	0.86	0.30	2.00	2.15
High Estimate	0.86	0.31	2.01	2.16
Low Estimate	0.85	0.30	2.00	2.10
Year ago EPS	0.80	0.28	1.88	2.00
Year over Year Growth Est.	6.88%	8.93%	6.49%	6.39%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	1	0	1	1
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	0	1	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	0.86	0.31	2.00	2.13
7 Days Ago	0.86	0.31	2.00	2.13
30 Days Ago	0.86	0.31	2.00	2.13
60 Days Ago	0.85	0.33	2.00	2.13
90 Days Ago	0.85	0.33	2.00	2.12

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.86	0.31	2.00	2.12
Zacks Consensus Estimate	0.86	0.31	2.00	2.13
Earnings ESP	0.00%	0.00%	-0.10%	-0.47%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.41	0.43	0.28	0.80	NA
Estimate	0.39	0.45	0.28	0.87	NA
Difference	0.02	-0.02	0.00	-0.07	-0.02
Surprise	5 13%	-4.44%	0 00%	-8 05%	-1.84%

Quarterly Estimates By Analyst

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At the center of everything we do is a strong commitment to independent research and sharing its profitable discoveries with investors This dedication to giving investors a trading advantage led to the creation of our proven Zacks Rank stock-rating system. Since 1988 it has more than doubled the S&P 500 with an average gain of +25% per year. These returns cover a period from 1988-2016 and were examined and attested by Baker Tilly Virchow Krause, LLP, an independent accounting firm. Zacks Rank stock-rating system returns are computed monthly based on the beginning of the month and end of the month Zacks Rank stock prices plus any dividends received during that particular month. A simple, equally-weighted average return of all Zacks Rank stocks is calculated to determine the monthly return. The monthly returns are then compounded to arrive at the annual return. Only Zacks Rank stocks included in Zacks hypothetical portfolios at the beginning of each month are included in the return calculations. Zack Ranks stocks can, and often do, change throughout the month. Certain Zacks Rank stocks for which no month-end price was available, pricing information was not collected, or for certain other reasons have been excluded from these return calculations.

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Real time prices by BATS. Delayed quotes by Sungard.

NYSE and AMEX data is at least 20 minutes delayed. NASDAQ data is at least 15 minutes delayed.

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NEE NextEra Energy, Inc. - Detailed Estimates - Zacks.c
10/25/17 12:52 PM

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NextEra Energy, Inc. (NEE)
(Real Time Quote from BATS)

$149.13 USD
-2.47 (-1.63%)
Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank:
3-Hold 3
Style Scores:
D Value | D Growth | B Momentum | D VGM
Industry Rank:
Bottom 38%(164 out of 265)
Industry: Utility - Electric Power

NextEra Energy, Inc. (NEE) Quote Overview » Estimates » NextEra Energy, Inc. (NEE) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

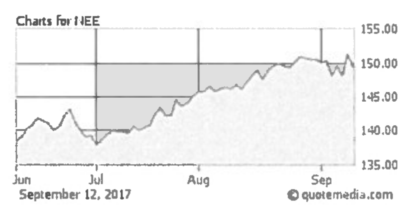
Next Report Date	10/30/17	Earnings ESP	1.42%
Current Quarter	1.77	Current Year	6.71
EPS Last Quarter	1.76	Next Year	7.23
Last EPS Surprise	5.68%	EPS (TTM)	6.56
ABR	1.38	P/E (F1)	22.58

Growth Estimates	NEE	IND	S&P
Current Qtr (09/2017)	1.44	NA	NA
Next Qtr (12/2017)	14.05	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.01
Past 5 Years	6.90	1.70	2.80
Next 5 Years	7.40	6.50	NA
PE	22.58	15.40	371.01
PEG Ratio	3.06	2.37	NA

Learn More About Estimate Research
See Brokerage Recommendations
See Earnings Report Transcript

Research for NEE

Chart for NEE



Interactive Chart | Fundamental Charts

Premium Research for NEE

Zacks Rank	Hold 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
NEE Nextera Energy...				

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Options Greek Montage

Access Zacks Data Feed

D Value | D Growth | B Momentum | D VGM

Earnings ESP	1.42%
Research Reports for NEE	Analyst I Snapshot

(= Change in last 30 days)

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Sales Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	4.92B	3.91B	17.20B	17.95B
# of Estimates	2	2	5	5
High Estimate	5.01B	4.21B	17.60B	18.19B
Low Estimate	4.83B	3.60B	16.82B	17.49B
Year ago Sales	4.81B	3.70B	16.16B	17.20B
Year over Year Growth Est.	2.40%	5.69%	6.46%	4.38%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.77	1.38	6.71	7.23
# of Estimates	4	4	8	8
Most Recent Consensus	1.75	1.44	6.75	7.25
High Estimate	1.84	1.44	6.75	7.32
Low Estimate	1.73	1.35	6.65	7.05
Year ago EPS	1.74	1.21	6.19	6.71
Year over Year Growth Est.	1.44%	14.05%	8.34%	7.83%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	1	1
Up Last 30 Days	0	0	1	1
Up Last 60 Days	0	1	4	6
Down Last 7 Days	1	0	0	0
Down Last 30 Days	1	0	0	0
Down Last 60 Days	3	2	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.77	1.38	6.71	7.23
7 Days Ago	1.78	1.39	6.70	7.22
30 Days Ago	1.78	1.39	6.70	7.22
60 Days Ago	1.81	1.35	6.67	7.19
90 Days Ago	1.85	1.36	6.65	7.12

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.79	1.36	6.70	7.23
Zacks Consensus Estimate	1.77	1.38	6.71	7.23
Earnings ESP	1.42%	-1.45%	-0.09%	-0.02%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	1.86	1.75	1.21	1.74	NA
Estimate	1.76	1.56	1.29	1.65	NA
Difference	0.10	0.19	-0.08	0.09	0.08
Surprise	5.68%	12.18%	-6.20%	5.45%	4.28%

Quarterly Estimates By Analyst

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At the center of everything we do is a strong commitment to independent research and sharing its profitable discoveries with investors. This dedication to giving investors a trading advantage led to the creation of our proven Zacks Rank stock-rating system. Since 1988 it has more than doubled the S&P 500 with an average gain of +25% per year. These returns cover a period from 1988-2016 and were examined and attested by Baker Tilly Virchow Krause, LLP, an independent accounting firm. Zacks Rank stock-rating system returns are computed monthly based on the beginning of the month and end of the month Zacks Rank stock prices plus any dividends received during that particular month. A simple, equally-weighted average return of all Zacks Rank stocks is calculated to determine the monthly return. The monthly returns are then compounded to arrive at the annual return. Only Zacks Rank stocks included in Zacks hypothetical portfolios at the beginning of each month are included in the return calculations. Zack Ranks stocks can, and often do, change throughout the month. Certain Zacks Rank stocks for which no month-end price was available, pricing information was not collected, or for certain other reasons have been excluded from these return calculations.

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Real time prices by BATS. Delayed quotes by Sungard.

NYSE and AMEX data is at least 20 minutes delayed. NASDAQ data is at least 15 minutes delayed.

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SRE Sempra Energy - Detailed Estimates - Zacks.com.pc
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Sempra Energy (SRE)
(Real Time Quote from BATS)

$118.32 USD

-1.83 (-1.52%)

Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank: 3-Hold 3

Style Scores: C Value | C Growth | C Momentum | C VGM

Industry Rank: Top 28%(75 out of 265)

Industry: Utility - Gas Distribution

Sempra Energy (SRE) Quote Overview » Estimates » Sempra Energy (SRE) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/1/17	Earnings ESP	-3.96%
Current Quarter	1.01	Current Year	5.19
EPS Last Quarter	0.80	Next Year	5.53
Last EPS Surprise	37.50%	EPS (TTM)	5.38
ABR	1.94	P/E (F1)	23.15

Growth Estimates	SRE	IND	S&P
Current Qtr (09/2017)	-0.98	NA	NA
Next Qtr (12/2017)	-10.97	NA	NA
Current Year (12/2017)	0.00	11.80	0.00
Next Year (12/2018)	0.00	5.70	0.02
Past 5 Years	3.50	-0.10	2.80
Next 5 Years	8.50	7.50	NA
PE	23.15	18.70	479.71
PEG Ratio	2.72	2.49	NA

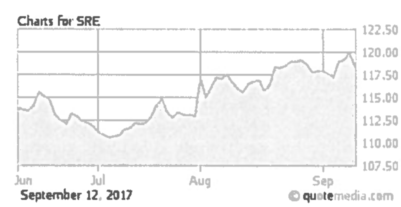
Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Research for SRE

Chart for SRE



Interactive Chart | Fundamental Charts

Premium Research for SRE

Zacks Rank	Hold 3
Zacks Industry Rank	Top 28%(75 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
SRE Sempra Energy				

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Options Greek Montage

Access Zacks Data Feed

C Value | C Growth | C Momentum | C VGM

Earnings ESP	-3.96%
Research Reports for SRE	Analyst | Snapshot

(= Change in last 30 days)

View All Zacks Rank #1 Strong Buys

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Sales Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	2.78B	3.08B	11.22B	11.65B
# of Estimates	1	1	3	3
High Estimate	2.78B	3.08B	11.46B	12.02B
Low Estimate	2.78B	3.08B	10.77B	11.13B
Year ago Sales	2.54B	2.87B	10.18B	11.22B
Year over Year Growth Est.	9.51%	7.45%	10.16%	3.82%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.01	1.35	5.19	5.53
# of Estimates	4	3	6	6
Most Recent Consensus	1.00	1.31	5.13	5.55
High Estimate	1.08	1.44	5.25	5.68
Low Estimate	0.97	1.31	5.10	5.48
Year ago EPS	1.02	1.52	5.05	5.19
Year over Year Growth Est.	-0.98%	-10.97%	2.71%	6.65%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	1	0
Up Last 30 Days	0	0	2	0
Up Last 60 Days	0	0	2	1
Down Last 7 Days	0	0	0	1
Down Last 30 Days	0	0	0	2
Down Last 60 Days	1	1	0	2

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.01	1.35	5.19	5.53
7 Days Ago	1.02	1.31	5.15	5.56
30 Days Ago	1.02	1.31	5.14	5.59
60 Days Ago	1.06	1.40	5.11	5.61
90 Days Ago	1.02	1.42	5.10	5.61

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.97	1.44	5.21	5.52
Zacks Consensus Estimate	1.01	1.35	5.19	5.53
Earnings ESP	-3.96%	6.41%	0.51%	-0.30%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	1.10	1.74	1.52	1.02	NA
Estimate	0.80	1.59	1.42	0.97	NA
Difference	0.30	0.15	0.10	0.05	0.15
Surprise	37.50%	9.43%	7.04%	5.15%	14.78%

Quarterly Estimates By Analyst

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Annual Estimates By Analyst

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KWalton

VVC Vectren Corporation - Detailed Estimates - Zacks.c
10/25/17 12:52 PM

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Vectren Corporation (VVC)

(Real Time Quote from BATS)

$66.53 USD

-1.65 (-2.42%)

Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank: 4-Sell 4

Style Scores: C Value | D Growth | C Momentum | D VGM

Industry Rank: Top 28%(75 out of 265)

Industry: Utility - Gas Distribution

Vectren Corporation (VVC) Quote Overview » Estimates » Vectren Corporation (VVC) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/1/17	Earnings ESP	0.00%
Current Quarter	0.67	Current Year	2.62
EPS Last Quarter	0.43	Next Year	2.80
Last EPS Surprise	4.65%	EPS (TTM)	2.70
ABR	2.86	P/E (F1)	26.03

Growth Estimates	VVC	IND	S&P
Current Qtr (09/2017)	-10.14	NA	NA
Next Qtr (12/2017)	-4.76	NA	NA
Current Year (12/2017)	0.00	11.80	0.00
Next Year (12/2018)	0.00	5.70	0.04
Past 5 Years	7.50	-0.10	2.80
Next 5 Years	5.50	7.50	NA
PE	26.03	18.70	950.86
PEG Ratio	4.73	2.49	NA

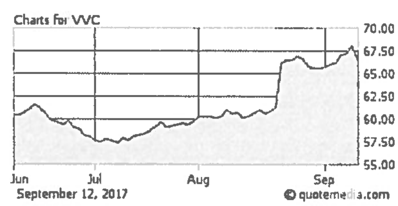
Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Research for VVC

Chart for VVC



Interactive Chart | Fundamental Charts

Premium Research for VVC

Zacks Rank	▼ Sell 4
Zacks Industry Rank	Top 28%(75 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
VVC Vectren Corpora...				

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Options Greek Montage

Access Zacks Data Feed

C Value | D Growth | C Momentum | D VGM

Earnings ESP	0.00%
Research Report for VVC	Snapshot

(= Change in last 30 days)

View All Zacks Rank #1 Strong Buys

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	2.68B	2.89B
# of Estimates	NA	NA	1	1
High Estimate	NA	NA	2.68B	2.89B
Low Estimate	NA	NA	2.68B	2.89B
Year ago Sales	631.00M	699.00M	2.45B	2.68B
Year over Year Growth Est.	NA	NA	9.50%	7.76%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	0.67	0.80	2.62	2.80
# of Estimates	2	1	6	6
Most Recent Consensus	0.68	0.80	2.60	2.80
High Estimate	0.68	0.80	2.65	2.85
Low Estimate	0.65	0.80	2.60	2.75
Year ago EPS	0.74	0.84	2.55	2.62
Year over Year Growth Est.	-10.14%	-4.76%	2.62%	7.01%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	0	0	0	0
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	1	1	1	1

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	0.67	0.80	2.62	2.80
7 Days Ago	0.67	0.80	2.62	2.80
30 Days Ago	0.67	0.80	2.62	2.80
60 Days Ago	0.70	0.82	2.62	2.81
90 Days Ago	0.70	0.82	2.62	2.80

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.67	0.80	2.63	2.80
Zacks Consensus Estimate	0.67	0.80	2.62	2.80
Earnings ESP	0.00%	0.00%	0.32%	0.00%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.45	0.67	0.84	0.74	NA
Estimate	0.43	0.65	0.78	0.64	NA
Difference	0.02	0.02	0.06	0.10	0.05
Surprise	4.65%	3.08%	7.69%	15.63%	7.76%

Annual Estimates By Analyst

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KWalton

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SCG Scana Corporation - Detailed Estimates - Zacks.cor
10/25/17 12:52 PM

Scana Corporation (SCG)

(Real Time Quote from BATS)

$59.06 USD

-0.62 (-1.04%)

Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank:
4-Sell 4

Style Scores:
B Value | C Growth | A Momentum | A VGM

Industry Rank:
Bottom 38%(164 out of 265)

Industry: Utility - Electric Power

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	10/26/17	Earnings ESP	-9.12%
Current Quarter	1.13	Current Year	4.22
EPS Last Quarter	0.74	Next Year	4.31
Last EPS Surprise	14.86%	EPS (TTM)	4.23
ABR	2.53	P/E (F1)	14.13

Growth Estimates	SCG	IND	S&P
Current Qtr (09/2017)	-14.14	NA	NA
Next Qtr (12/2017)	18.01	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.02
Past 5 Years	6.50	1.70	2.80
Next 5 Years	4.70	6.50	NA
PE	14.13	15.40	589.60
PEG Ratio	3.03	2.37	NA

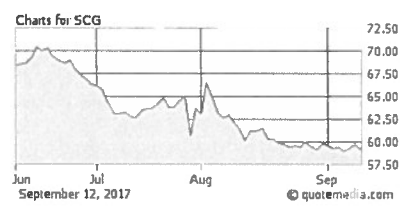
Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Research for SCG

Chart for SCG



Interactive Chart | Fundamental Charts

Premium Research for SCG

Zacks Rank	▼ Sell 4
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
SCG Scana Corporati...				

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Options Greek Montage

Access Zacks Data Feed

B Value | C Growth | A Momentum | A VGM

Earnings ESP	-9.12%
Research Reports for SCG	Analyst | Snapshot

(= Change in last 30 days)

View All Zacks Rank #1 Strong Buys

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	4.46B	4.64B
# of Estimates	NA	NA	3	3
High Estimate	NA	NA	4.81B	5.05B
Low Estimate	NA	NA	4.22B	4.42B
Year ago Sales	1.09B	1.06B	4.23B	4.46B
Year over Year Growth Est.	NA	NA	5.45%	4.00%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.13	1.03	4.22	4.31
# of Estimates	3	3	4	5
Most Recent Consensus	1.17	1.01	4.23	4.30
High Estimate	1.20	1.05	4.25	4.70
Low Estimate	1.03	1.01	4.15	4.10
Year ago EPS	1.32	0.87	4.16	4.22
Year over Year Growth Est.	-14.14%	18.01%	1.44%	2.13%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	0	0	0	0
Down Last 7 Days	0	0	1	1
Down Last 30 Days	0	0	1	1
Down Last 60 Days	2	2	0	3

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.13	1.03	4.22	4.31
7 Days Ago	1.13	1.03	4.22	4.31
30 Days Ago	1.13	1.03	4.22	4.31
60 Days Ago	1.14	1.04	4.23	4.43
90 Days Ago	1.14	1.05	4.23	4.44

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.03	1.02	4.25	4.23
Zacks Consensus Estimate	1.13	1.03	4.22	4.31
Earnings ESP	-9.12%	-0.65%	0.71%	-1.97%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.85	1.19	0.87	1.32	NA
Estimate	0.74	1.37	0.93	1.05	NA
Difference	0.11	-0.18	-0.06	0.27	0.04
Surprise	14.86%	-13.14%	-6.45%	25.71%	5.25%

Quarterly Estimates By Analyst

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Annual Estimates By Analyst

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Real time prices by BATS. Delayed quotes by Sungard.

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PPL PPL Corporation - Detailed Estimates - Zacks.com.p
10/25/17 12:53 PM

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PPL Corporation (PPL)

(Real Time Quote from BATS)

$39.07 USD

-0.79 (-1.98%)

Updated Sep 12, 2017 03:58 PM ET

Add to portfolio | Trades from $1

Zacks Rank: 3-Hold 3

Style Scores: C Value | F Growth | B Momentum | F VGM

Industry Rank: Bottom 38%(164 out of 265)

~~Industry: Utility - Electric Power~~

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/7/17	Earnings ESP	0.00%
Current Quarter	0.54	Current Year	2.15
EPS Last Quarter	0.50	Next Year	2.31
Last EPS Surprise	4.00%	EPS (TTM)	2.37
ABR	2.43	P/E (F1)	18.51

Growth Estimates	PPL	IND	S&P
Current Qtr (09/2017)	-14.29	NA	NA
Next Qtr (12/2017)	-20.00	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.05
Past 5 Years	-2.40	1.70	2.80
Next 5 Years	5.00	6.50	NA
PE	18.51	15.40	1,156.51
PEG Ratio	3.70	2.37	NA

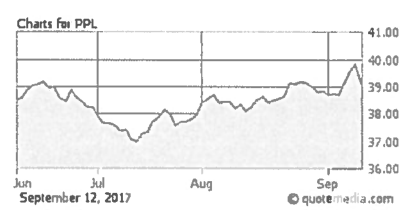
Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Research for PPL

Chart for PPL



Interactive Chart | Fundamental Charts

Premium Research for PPL

Zacks Rank	▼ **Hold** 3
Zacks Industry Rank	Bottom 38%(164 out of 265)
Zacks Sector Rank	Bottom 38% (10 out of 16)
Style Scores	

Predict to see real-time community sentiment

	Wednesday	In a Week	In a Month	In 3 Months
PPL Ppl Corporation				

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Options Greek Montage

Access Zacks Data Feed

C Value I F Growth I B Momentum I F VGM

Earnings ESP	0.00%
Research Reports for PPL	Analyst I Snapshot

(= Change in last 30 days)

View All Zacks Rank #1 Strong Buys

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Sales Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.91B	1.85B	7.40B	8.04B
# of Estimates	1	1	2	2
High Estimate	1.91B	1.85B	7.44B	8.09B
Low Estimate	1.91B	1.85B	7.37B	7.99B
Year ago Sales	1.89B	1.83B	7.52B	7.40B
Year over Year Growth Est.	1.21%	0.99%	-1.50%	8.59%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	0.54	0.48	2.15	2.31
# of Estimates	4	4	7	7
Most Recent Consensus	0.56	0.45	2.15	2.30
High Estimate	0.56	0.50	2.16	2.35
Low Estimate	0.51	0.45	2.15	2.29
Year ago EPS	0.63	0.60	2.45	2.15
Year over Year Growth Est.	-14.29%	-20.00%	-12.19%	7.57%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	1	1	1	1
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	3	2	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	0.54	0.48	2.15	2.31
7 Days Ago	0.54	0.48	2.15	2.31
30 Days Ago	0.54	0.48	2.15	2.31
60 Days Ago	0.56	0.48	2.15	2.31
90 Days Ago	0.56	0.49	2.15	2.31

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	0.54	0.48	2.15	2.31
Zacks Consensus Estimate	0.54	0.48	2.15	2.31
Earnings ESP	0.00%	0.00%	0.00%	0.00%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.52	0.62	0.60	0.63	NA
Estimate	0.50	0.62	0.52	0.59	NA
Difference	0.02	0.00	0.08	0.04	0.04
Surprise	4.00%	0.00%	15.38%	6.78%	6.54%

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-1.08 (-2.12%)

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Industry Rank:
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~~**Industry: Utility - Electric Power**~~

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Detailed Estimates

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Estimates

Next Report Date	10/30/17	Earnings ESP	0.00%
Current Quarter	1.15	Current Year	2.95
EPS Last Quarter	0.71	Next Year	3.01
Last EPS Surprise	2.82%	EPS (TTM)	2.91
ABR	2.78	P/E (F1)	17.16

Growth Estimates	SO	IND	S&P
Current Qtr (09/2017)	-10.35	NA	NA
Next Qtr (12/2017)	73.96	NA	NA
Current Year (12/2017)	0.00	4.70	0.00
Next Year (12/2018)	0.00	9.40	0.03
Past 5 Years	2.60	1.70	2.80
Next 5 Years	4.30	6.50	NA
PE	17.16	15.40	843.77
PEG Ratio	4.04	2.37	NA

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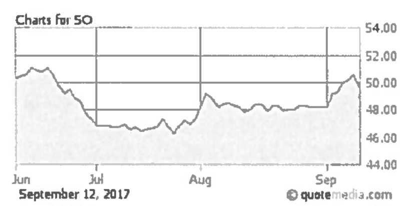

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Sales Estimates

	Current Qtr (ND)	Next Qtr (ND)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	M	NA	23.06B	23.78B
# of Estimates	NA	NA	3	3
High Estimate	NA	NA	24.70B	25.73B
Low Estimate	NA	NA	21.84B	22.38B
Year ago Sales	6.26B	5.18B	19.86B	23.06B
Year over Year Growth Est.	NA	NA	16.08%	3.14%

Earnings Estimates

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Zacks Consensus Estimate	1.15	0.42	2.95	3.01
# of Estimates	4	4	8	8
Most Recent Consensus	1.06	0.50	2.95	3.02
High Estimate	1.30	0.50	2.98	3.05
Low Estimate	1.06	0.30	2.91	2.99
Year ago EPS	1.28	0.24	2.89	2.95
Year over Year Growth Est.	-10.35%	73.96%	2.03%	2.20%

Agreement - Estimate Revisions

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Up Last 7 Days	0	0	0	1
Up Last 30 Days	0	0	0	1
Up Last 60 Days	1	2	0	0
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	2	1	4	5

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Current	1.15	0.42	2.95	3.01
7 Days Ago	1.15	0.42	2.95	3.01
30 Days Ago	1.15	0.42	2.95	3.01
60 Days Ago	1.24	0.36	2.96	3.05
90 Days Ago	1.22	0.37	2.96	3.09

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2017)	Next Qtr (12/2017)	Current Year (12/2017)	Next Year (12/2018)
Most Accurate Estimate	1.15	0.42	2.95	2.99
Zacks Consensus Estimate	1.15	0.42	2.95	3.01
Earnings ESP	0.00%	0.00%	0.00%	-0.79%

Surprise - Reported Earnings History

	Quarter Ending (6/2017)	Quarter Ending (3/2017)	Quarter Ending (12/2016)	Quarter Ending (9/2016)	Average Surprise
Reported	0.73	0.66	0.24	1.28	NA
Estimate	0.71	0.58	0.31	1.17	NA
Difference	0.02	0.08	-0.07	0.11	0.04
Surprise	2.82%	13.79%	-22.58%	9.40%	0.86%

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NO.	Title
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WP-3	Moody's Investors Service, "Credit Opinion: Louisville Gas & Electric Company.," *Global Credit Research* (Dec. 8, 2013)
WP-4	Hilsenrath, Jon, "Fed Dials Back Bond Buying, Keeps a Wary Eye on Growth," *The Wall Street Journal* at A1 (Dec. 19, 2013)
WP-5	Appelbaum, Binyamin, "Federal Reserve's Bond-Buying Fades, but Stimulus Doesn't End There," *The New York Times* (Jun. 19, 2014)
WP-6	Federal Open Market Committee, *Press Release* (Sep. 17, 2014)
WP-7	Talley, Ian, "IMF Urges 'Improved' U.S. Fed Policy Transparency as It Mulls Easy Money Exit," *The Wall Street Journal* (July 26, 2013)
WP-8	Jon Hilsenrath and Victoria McGrane, "Yellen Debut Rattles Markets," Wall Street Journal (Mar. 19, 2014)
WP-9	Poole, William, "Prospects for and Ramifications of the Great Central Banking Unwind," *Financial Analysts Journal* (November/December 2013)
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WP-16	*Morningstar*, "Ibbotson SBBI 2013 Valuation Yearbook," at p. 85
WP-17	*Morningstar*, "Ibbotson SBBI Market Report," at Table 10
WP-18	Brigham, E.F., Shome, D.K., and Vinson, S.R., "The Risk Premium Approach to Measuring a Utility's Cost of Equity," *Financial Management* (Spring 1985)
WP-19	Harris, R.S., and Marston, F.C., "Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts," *Financial Management* (Summer 1992)
WP-20	Morin, Roger A., "New Regulatory Finance," Public Utilities Reports, at 128 (2006)
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FORWARD TEST YEARS FOR US ELECTRIC UTILITIES

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August 2010

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EXECUTIVE SUMMARY

U.S. investor-owned electric utilities (electric "IOUs") in jurisdictions with historical test year rate cases are grappling today with financial stresses that threaten their ability to serve the public well. Unit costs are rising because growth in sales volumes and other billing determinants is not keeping pace with growth in cost. Cost growth is stimulated by the need to rebuild and expand legacy infrastructure and to meet environmental and other public policy goals. In this situation historical test years, still used in almost 20 U.S. jurisdictions, can erode credit quality and condemn IOUs to chronic underearning.

This report provides an in depth discussion of the test year issue. It includes the results of empirical research which explores why the unit costs of electric IOUs are rising and shows that utilities operating under forward test years realize higher returns on capital and have credit ratings that are materially better than those of utilities operating under historical test years. The research suggests that shifting to a future test year is a prime strategy for rebuilding utility credit ratings as insurance against an uncertain future.

CHAPTER 1 (FORWARD TEST YEARS) provides an introduction to test year issues. Problems with historical test years are discussed. We explain that the "matching principle" used to rationalize historical test years assumes that cost and revenue remain balanced. This assumption doesn't hold when unit cost is rising. In a rising unit cost environment, rates based on historical test years are uncompensatory even in the year they are implemented. As a result, operating risk increases, raising the cost of obtaining funds in capital markets. Service quality may be compromised. Customers receive out of date price signals that encourage excessive consumption. The problems are aggravated when rate hearings are protracted. Utilities commonly respond with more frequent rate case filings but these raise regulatory cost, weaken performance incentives, and distract managers from their basic business while still not giving utilities sufficient attrition relief. It is unfair to expect utilities to offset revenue shortfalls produced by regulatory lag with higher productivity and unrealistic to think that they can do so. Forward test years can yield better results for utilities and their customers.

The unit cost trends of utilities are driven by conditions that are substantially beyond their control. These conditions include trends in input prices, productivity, and the average use of utility services by customers. For the matching principle to work, some combination of growth in utility productivity and average use must offset input price inflation.

Utility efforts to promote customer energy conservation slow growth in average use, thereby raising unit cost and making historical test year rates less compensatory. Forward test years can anticipate the slower growth in average use that results from utility conservation programs. They therefore help to remove utility disincentives to promote conservation aggressively.

The forecasts of costs and billing determinants that are made in a forward test year proceeding are uncertain but involve conditions that are at most two years into the future. A large part of utility cost is no more difficult to budget under forward test years than under historical test years. More volatile components of cost are often subject to true-up mechanisms. Conservative, well-reasoned methods for making forecasts are available. In a rising unit cost environment, the uncertainty of forecasts is less of a concern than the bias of historical test year rates.

Utilities seeking forward test years must be mindful of their high evidentiary burden. The following rate case measures bolster confidence.

- Provide concrete evidence as to why future test years and not historical test years are needed under current circumstances. Evidence concerning trends in the unit cost of utilities and in key unit cost drivers is especially pertinent.
- Provide cost and billing determinant data for one or more historical reference years and carefully explain methodologies for predicting cost and billing determinant changes between those years and the forward test year.
- Use forecasting methods that are transparent and based on reason but not needlessly complex.
- Routine variance reports comparing costs and billing determinants to utility forecasts can increase comfort that forecasts are unbiased.

CHAPTER 2 (TEST YEAR HISTORY) presents a brief history of test years in the United States. Historical test years became the norm in the U.S. because periods of stable or declining unit cost, made possible by slow price inflation and brisk growth in utility productivity and average use, were the rule rather than the exception in the electric utility industry prior to the late 1960s. Growth in productivity and average use have slowed enough in subsequent decades that unit cost has frequently risen. Under favorable business conditions, unit cost can still be flat for several years, making historical test years more reasonable. However, conditions like these can give way to conditions in which unit cost rises for years at a time.

Forward test years were adopted in many jurisdictions during the 1970s and 1980s as unit cost grew briskly, spurred by input price inflation and slower growth in average use and utility productivity. Unit cost growth was flat during most of the 1990s because business conditions driving unit cost growth were more favorable. Input price inflation slowed. Investment needs were more limited, as many utilities grew into capacity added during the construction cycle of the 1970's and early 1980's. Average use grew less rapidly than in the past but nonetheless increased appreciably in most years. Under these conditions, utilities were sometimes able to commit to multiyear base rate freezes.

Unit cost growth has since rebounded due to higher inflation, increased plant additions, and slowing growth in average use. Commissions in several states with historical test year traditions have recently moved in the direction of forward test years. Many of these states are in the West, where comparatively rapid economic growth has stimulated plant additions. The ranks of U.S. jurisdictions that use alternatives to historical test years have swollen and now encompass well over half of the total.

In summary, historical test years became the norm in U.S. rate cases during decades when unit cost was flat or declining due to remarkably brisk utility productivity and average use. Under contemporary conditions, in which average use grows slowly, if at all, and the productivity growth of utilities is more like that of the economy, unit cost may rise for extended periods undermining the matching principle.

CHAPTER 3 (EMPIRICAL SUPPORT FOR FORWARD TEST YEARS) presents results of some empirical research on test year issues. In original work for this paper, we calculated the unit cost trends of a sample of vertically integrated electric utilities from 1996 to 2008. Trends in business conditions that drive unit cost growth were measured. We also considered how test year policies affect credit metrics and utility operating performance.

Here are some salient results.

- The unit cost of sampled utilities was fairly stable from 1996 to 2002 but has since rebounded, averaging 2.3% annual growth from 2003 to 2008. The underlying causes of rising unit cost included higher input price inflation and capital spending and slower growth in the average system use of residential and commercial customers.
- In the three year period from 2006 to 2008 average use actually declined for the typical utility, pulled down by sluggish economic growth and government policies that encourage conservation. The decline was especially marked in states with large conservation programs.
- These results suggest that many IOUs may not be able in the future to count on brisk growth in average use by residential and commercial customers to buffer the impact on unit cost growth of input price inflation and increased plant additions. The problem will be considerably more acute in service territories where there are aggressive conservation programs.
- Utilities operating under forward test years were more profitable and had better credit ratings on average than those of utilities operating under historical test years. For example, from 2006 to 2008 utilities operating under forward test years realized an average return on capital of 9.2% and maintained a typical credit rating between A- and BBB+ whereas the utilities operating under historical test years realized an average return of 7.9% and maintained a typical credit rating between BBB and BBB-.
- Examination of recent trends in operation and maintenance ("O&M") expenses of utilities provides no evidence that historical test years encourage better cost management.

CHAPTER 4 (CONCLUDING REMARKS) provides some suggestions as to how interested regulators can get started down the road to forward test years.

1. Allow a forward test year on a trial basis for one interested utility.

2. Allow forward test years on an as needed basis when a utility makes a convincing case that rising unit costs make historical test years unjust and unreasonable.
3. Borrow one or two of the methods used in FTY rate cases to make additional adjustments to *historical* test year costs and billing determinants. For example, historical test year O&M expenses can be adjusted for forecasts of price inflation prepared by respected independent agencies. Special adjustments can be made for large plant additions that are expected to be finished in the near future.
4. Try a current test year (essentially the year of the rate case), which involves forecasts only one year into the future. Current test years can be combined with interim rate increases which are subject to true up when the rate case is finalized. A combination of a current test year and interim rates eliminates regulatory lag without the necessity of a two year forecast.

In states where regulators aren't ready to abandon historical test years but are sympathetic to the attrition problems caused by rising unit costs, alternative measures are available to relieve the financial attrition. Options include the following:

1. Make sure that historical test year calculations incorporate the full array of normalization, annualization, and known and measurable change adjustments that are used in other jurisdictions.
2. Grant utilities interim rate increases at the outset of a rate case. Even when later adjusted for the final rate case outcome, interim rates effectively reduce regulatory lag by a year.
3. Capital spending trackers can ensure timely recovery of the costs of plant additions, without rate cases, as assets become used and useful.
4. Several methods have been established to compensate utilities for acceleration in unit cost growth that results from flat or declining average system use. These include decoupling true up plans, lost revenue adjustment mechanisms, and higher customer charges.
5. Multiyear rate plans can give utilities rate escalation between rate cases for inflation and other business conditions that drive cost growth.

1. FORWARD TEST YEARS

This chapter provides an in depth discussion of test year issues. Basic test year concepts are introduced in Section 1.1. The rationale for forward test years is discussed in Section 1.2. The kinds of evidence used in forward test year proceedings are explored in Section 1.3.

1.1 Basic Concepts

1.1.1 Rate Cases

In the United States, rates for the services of energy utilities are periodically reset by regulators in litigated proceedings called rate cases. These cases typically take about nine or ten months to resolve and sometimes end in a settlement between contending parties which is approved by the regulator. The first year following approval of new rates is called the "rate year".

In a rate case, rates are reset to reflect the cost and service levels of the utility in a test year. The first step in this process is to establish a revenue "requirement" that is commensurate with a cost for service deemed reasonable for test year operating conditions. Rates are then established which recover the revenue requirement given the levels of service provided in the test year. The service levels (*e.g.* the number of customers served and the power delivery volume) are sometimes called "billing determinants".

Bills of energy utilities often contain charges to recover the cost of energy commodities (*e.g.* fuel and purchased power) procured on a customer's behalf which are separate from the charges to recover the cost of capital, labor, and other inputs used to operate their systems. The rates that recover the costs of non-energy inputs are commonly called "base" rates. Base rate revenues are sometimes called "margins".

Rates for the cost of energy procurement are commonly subject to true ups to recover the actual cost of energy procured. Base rates, on the other hand, have traditionally been reset only in rate cases. The earnings of utilities thus depend primarily on the difference between their base rate revenues and the cost of their base rate inputs.

1.1.2 Historical Test Years

Various kinds of test years are used in rate cases today. An historical test year ("HTY") is a twelve month period that ends before the rate case filing. It typically ends a few months before the filing because it is desirable for the test year to be as current as possible but it takes several months to properly account for a year of costs and take the other steps needed to prepare a rate case. The year between an historical test year and the rate year is sometimes called the "bridge year".

The passage of time between a test year and the rate year is sometimes called "regulatory lag".[1] The lag between an historical test year and the rate year is typically two years. A utility filing for new rates in calendar 2011, for example, would typically file in March or April of 2010 using a calendar 2009 test year. Thus, historical test year rates applicable in 2011 would typically reflect business conditions in 2009.

Regulatory lag in this case has several causes. One is the necessity of using a year of historical data in the rate case filing. Another is the time required to prepare a rate case filing. Still another is the time required to execute the rate case and reach a final decision on new rates.

Historical test year data are usually adjusted in some fashion to make rates more relevant to rate year business conditions. Costs and billing determinants are often normalized for the effects of volatile business conditions on the grounds that there is no reason to expect these conditions to be abnormal during the rate year. For example, if residential and commercial delivery volumes during an historical test year were elevated by unusually high summer temperatures, they may be statistically normalized to reflect average summer weather conditions. Other examples of abnormal events that can prompt normalization adjustments include ice storms, recessions, and extended generation plant outages.

Cost and output conditions in the historical test year may also be "annualized". Effects may be removed, for a full year, of conditions that occurred during part of the HTY but are not expected to continue. One example would be costs reported for the HTY that pertained to years before the test year. Another would be the volume and peak demand of a large industrial customer who has closed its local operations.

Impacts of conditions that occurred only during certain months of the test year and are expected to prevail in the near future may also be annualized. For example, the value of the rate base at the end of an historical test year is sometimes assumed to be applicable for

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[1] This is one of several definitions of "regulatory lag" which are sometimes used in discussions of regulation. Another is the length of time between rate cases.

the entire year for purposes of calculating depreciation and the return on rate base. If union wage rates are raised in the last month of the HTY pursuant to the terms of a labor contract, labor expenses may be adjusted so that the higher cost per employee is effective for the entire year.

Cost and output data may, additionally, be adjusted for "known and measurable" (sometimes called "imminent certain") changes that have already occurred since the historical test year or are likely to occur in the near future. For example, if a labor contract provides for an escalation in union wages in the bridge year, HTY cost may be adjusted to reflect the wage rates provided in the contract.

The adjustments made to HTY cost and billing determinants vary across jurisdictions. While all such adjustments tend to make rates more relevant to rate year conditions, the HTY adjustment process often ignores important changes in business conditions that occur between an historical test year and a rate year. Here are some typical omissions.

- Cost is usually not adjusted to reflect future inflation in the prices of materials, services, and new equipment because the extent of such inflation isn't known with certainty.
- Costs of plant additions in the bridge year and the rate year are often omitted if their completion date and/or final cost aren't known with certainty.
- Billing determinants are usually not adjusted to reflect trends that are likely to occur after the test year because these are not known with certainty.
- Adjustments for known and measurable changes are sometimes limited arbitrarily to the bridge year.

1.1.3 Forward and Hybrid Test Years

A forward or future test year ("FTY") is a twelve month period that begins after the rate case is filed. Test year cost and billing determinants must in this case be forecasted, and forward test years are for this reason sometimes called forecasted test years. Utilities in some jurisdictions file rate cases with *multiple* forward test years. In the Canadian province of Alberta, for instance, it has recently been common for utilities to file for two forward test years in a rate case.

Most commonly, a forward test year begins about the time that the rate case is expected to end. The test year is then the same as the rate year. A utility filing on April 1

2010, for instance, might use calendar 2011 as its test year on the assumption that the rate case will take nine months to complete.

Some utilities use FTYs that begin about the time of the rate case filing. This kind of test year may be called a "current" FTY. The initial filing is in this case based entirely on forecasts but some months of actual data for the test year become available in the course of the proceeding.

Utilities in some states make rate case filings using test years that encompass some months *before* the filing and some months *afterwards*. Data for all months of the test year are then likely to become available during the course of the filing. This kind of test year has been called a "hybrid" or "partial" test year.

1.2 Rationale for Forward Test Years

1.2.1 The Financial Challenge

The Key Role of Unit Cost

We have noted that the rates that result from a rate case are designed to recover a revenue requirement that equals cost in a test year. In the case of an historical test year the new rates embody business conditions that are typically about two years older than those of the rate year. Business conditions are likely to change between an historical test year and the rate year, causing both cost and revenue to differ from the HTY level. For rates to be exactly compensatory, base rate cost and revenue must differ from their HTY levels in the same proportion.

The assumption that cost and revenue remain in balance underlies the matching principle that regulators still use to rationalize historical test years. Kamershen and Paul note in a thoughtful 1978 article on regulatory lag that "Philosophically, the strict [historical] test year assumes the past relationship among revenues, costs, and net investment will continue into the future."[2] A 2003 NARUC *Rate Case and Audit Manual* states in this regard that

> When looking at an historical test year, one of the first questions asked is whether the test year is too stale to make it a reasonable basis upon which to establish rates for a future period… In looking at the months beyond the end of the test year, have the growth rates for rate base, expenses, and revenues all remained fairly close and constant, maintaining the test year relationship

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[2] David R. Kamershen and Chris W. Paul II, "Erosion and Attrition: A Public Utility's Dilemma", *Public Utilities Fortnightly*, December 1978, p. 23.

> among these three elements, or has one element changed dramatically, making the test year out of kilter with current operations? If so, can this situation be resolved through adjustments to the test year?[3]

Cost in the rate year is likely to be substantially higher than cost in an historical test year. To understand why, consider that cost growth in any business can be decomposed into inflation in the prices it pays for inputs plus the growth in its output less the growth in its productivity:

growth Cost = growth Input Prices + growth Output – growth Productivity. [1]

The productivity growth of a business is typically not rapid enough to offset the combined effects of input price inflation and output growth. A recent study reported in testimony by Pacific Economics Group ("PEG") found, for example, that a national sample of U.S. power distributors averaged 1.03% annual growth in multifactor productivity ("MFP") from 1996 to 2006 whereas input price growth averaged 2.72% and customer growth averaged 1.00%.[4] The productivity trend of sampled distributors was similar to that of the U.S. private business sector but far from sufficient to offset the combined effects on cost of input price inflation and customer growth.

As for base rate revenue during the rate year, it can exceed the HTY revenue requirement only due to growth in billing determinants because rates are fixed at levels that reflect HTY conditions. Whether or not historical test year rates are compensatory thus depends critically on whether *unit* cost is stable in the sense that growth in billing determinants has kept pace with cost growth. If cost growth exceeds growth in billing determinants, unit cost will rise and HTY rates will be uncompensatory.

An element of complexity is added when it is considered that a utility offers many services and gathers revenue for each service from multiple charges, each with its own billing determinant. A bill for residential service, for instance, typically involves a flat monthly charge called a "customer" or "basic" charge and a "volumetric" (per kWh) charge. In this world of multiple billing determinants, historical test years will yield uncompensatory rates to the extent that cost growth between the test year and the rate year exceeds a *weighted average* of the growth in billing determinants, where the weight for each determinant is its

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[3] NARUC Staff Subcommittee on Accounting and Finance, *Rate Case and Audit Manual*, Summer 2003.
[4] Mark Newton Lowry, *et al., Revenue Adjustment Mechanisms for Central Vermont Public Service Corporation*, Exhibit CVPS-Rebuttal-MNL-2 in Docket No. 7336, June 2008.

share of the total base rate revenue. In other words, rates are uncompensatory when cost growth exceeds the growth in a billing determinant *index*. This is the definition of growth in a *unit cost index*.

The utility uses most of its base rate revenue to pay its workforce, vendors of materials and services (including construction services), bondholders, and tax authorities. The residual margin, called net income or earnings, is available to provide the company's shareholders with a return on their investments. The return on equity is the component of cost that is most at risk for non-recovery when base rate revenue falls short of cost. When historical test year rates are non-compensatory they can reduce a utility's rate of return on equity ("ROE") materially.

<u>Unit Cost Drivers</u>

If the unit cost growth of a utility has made new historical test year rates non-compensatory, it may fairly be asked whether utility actions could have stopped the growth and avoided the problem. Research over many years has shown that the unit cost of a utility is driven chiefly by changes in business conditions that are beyond its control. Growth in the unit cost of a utility's base rate inputs depends on inflation in the prices it pays for those inputs, growth in the productivity with which it uses the inputs, and an average use effect:

$$\textit{growth Unit Cost} = \textit{growth Input Prices} - (\textit{growth Productivity} + \textit{Average Use}). \qquad [2]$$

We discuss each of these unit cost "drivers" in turn.

Input Price Inflation Inflation routinely occurs in the prices utilities pay for labor, materials, services, and equipment. Since utilities have capital-intensive technologies, inflation in the price of capital is an especially important driver of their input price growth. The trend in the price of capital depends chiefly on trends in construction costs, tax rates, and the going rates of return on debt and equity in capital markets.[5]

Productivity The productivity growth of a utility depends on various conditions that include technological change, the realization of scale economies, and the pace of plant additions as

[5] The impact of construction cost on price inflation is complex. In setting rates, utility plant is valued in historical dollars. The cost of service thus depends on prices paid for construction in past decades. Construction costs in more recent years matter more because the corresponding assets are less depreciated. The rate base will tend, on average, to reflect construction costs more than a decade into the past. For most utilities, new investments therefore embody more than a decade of construction cost inflation compared to investments of average vintage. This is one of the reasons why unusually large plant additions can increase the rate base so substantially.

well as utility efforts to root out inefficiencies. Plant additions may boost efficiency gains in the long run but can slow them in the short run, especially if they involve major investments such as new base load generating units, advanced metering infrastructure, or an accelerated program to replace aging infrastructure. Scale economies depend on the pace of output growth and on whether the utility is so large that it has reached a minimum efficient scale at which incremental scale economies from output growth aren't available.

The ability of utilities to achieve productivity surges is limited in the short run. Since technology is capital intensive, the depreciation and return on rate base associated with older investments --- which cannot be changed in the short run --- account for a large share of the total cost of base rate inputs. A utility can increase productivity only by slowing growth in O&M expenses and plant additions. Opportunities to achieve *sustained* productivity gains often involve sizable upfront costs and net gains may not occur for more than a year. A downsizing of the labor force, for instance, may involve severance payments. The chief means for a utility to trim its cost in the very short run is to defer maintenance expenses and plant additions. Such deferrals must be followed by higher expenses in short order if service quality is to be maintained. A utility can't rely on a deferral strategy year after year when it is filing frequent rate cases.

Average Use A utility's unit cost growth also depends on the difference in the impact that its output growth has on its revenue and its cost. When output growth boosts revenue more than cost, unit cost growth slows. When output growth causes cost to rise more rapidly than revenue, unit cost growth accelerates.

A utility's output growth has different impacts on revenue and cost when two conditions are present. One is that the design of base rates doesn't reflect the drivers of base rate input cost. The other is that billing determinants tend to grow at a different rate than cost drivers.

Consider, first, whether the design of utility base rates is cost causative. The cost of a utility's base rate inputs is largely fixed in the short run with respect to system use. Cost is much more sensitive to growth in the number of customers served.[6] As for billing determinants, we have seen that utility tariffs for most services involve multiple charges. These include one or more "variable" charges that are so called because they vary with

[6] Cost growth may also depend, in the long run, on the growth in peak demand and/or the delivery volume.

system use. Volumetric charges vary with the volume of power delivered. "Demand" charges vary with the peak level of demand (*i.e.* the highest hourly volume registered during the month). There are, additionally, "fixed" charges that are so called because they do not vary with a customer's use of the system during the billing period. Chief amongst the fixed charges of electric utilities are customer charges. Residential and small business customers account for the bulk of a utility's base rate revenue because these customers account for the bulk of a utility's cost. In these customer classes, base rate revenue is drawn chiefly from volumetric charges.

Under these circumstances, the difference between the way that output growth affects revenue and cost is chiefly a matter of the difference between the trends in the volume of sales to residential and small business customers and the trends in the number of customers served. This is equivalent to the trends in the delivery *volume per customer* of these service classes, which are sometimes referred to as the trends in their average (system) use. Unit cost growth slows when average use rises and accelerates when growth in average use slows.

In the electric utility industry, as in most sectors of the economy, the productivity growth of utilities has for decades been a good bit slower than the inflation in the prices they pay for inputs.[7] The recent PEG study noted earlier, for example, found that power distributor productivity growth fell short of input price growth by about 169 basis points annually on average from 1996 to 2006.[8] Under conditions like these, the average use trends of residential and small-volume business customers play an important role in determining whether a utility's unit cost rises. If growth in average use is *brisk* (*e.g.* 1.5 to 2% annually), the difference between input price and cost efficiency growth can be offset.[9] If average use is *static*, unit cost will rise substantially even under normal inflationary conditions. If average use is *declining*, the rise in unit cost can be quite rapid.

Recent changes in state and federal policy are encouraging more electricity demand-side management ("DSM") and development of customer-sited solar resources. These policies include net metering, tighter appliance efficiency standards and building codes, and

[7] The difference is greater in periods of brisk input price inflation and smaller in periods of slow inflation, since productivity does not characteristically rise and fall with inflation.
[8] Lowry *et al.* (2008) *op. cit.*
[9] Irston Barnes wrote, for example, in a classic treatise on rate regulation, that "as an offset to such factors making for rising rates, the increased volume of business that usually accompanies an upward movement of prices may so reduce the overhead charges per unit as to make any increase in rates unnecessary". See Irston R. Barnes, *The Economics of Public Utility Regulation* (New York: F.S. Crofts, 1942).

subsidies for energy efficiency investments. Our discussion suggests that such programs can accelerate unit cost growth by slowing growth in average use. Whether or not the utility provides DSM programs, average use can become static or decline, removing a key means by which utilities have traditionally coped with input price inflation and avoided unit cost growth. The problem can be remedied by redesigning rates in ways that raise customer charges. But rate designs are regulated and regulators in the United States generally do not sanction high customer charges.[10]

Implications Our analysis suggests that the unit cost of an electric utility is likely to rise, making historical test year rates non-compensatory, to the extent that the following external business conditions prevail.

- Input price inflation is brisk.
- Utilities need to make large plant additions that temporarily slow productivity growth.
- Average use of the utility system is static or declining.

Situations in which unit cost is stable, encouraging use of historical test years, include those in which inflation is slow, utilities aren't making large plant additions, and average use is growing briskly.

A program to accelerate the replacement of aging distribution facilities provides a classic example of the non-compensatory nature of historical test year rates. Suppose that a power distributor replaces 10% of its distribution infrastructure during a year when new rates are implemented. The new plant has capacity similar to the plant replaced but reflects more than forty years of construction cost inflation. The company's rate base will rise substantially, temporarily slowing productivity growth and accelerating unit cost growth. Even with normal growth in input prices and average use a utility with rates based on historical test years may earn little return on this sizable investment for as much as two years after it becomes used and useful.

Conclusions

These results permit us to draw several conclusions concerning the reasonableness of historical test years in ratemaking.

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[10] High customer charges are more common for U.S. gas utilities and for gas and electric IOUs in Canada.

1) Historical test years are rationalized by a matching principle that assumes a balance of cost and revenue. Our analysis shows that this relationship is not balanced in a rising unit cost environment.
2) An individual utility reporting that rates produced by historical test years are uncompensatory may be suspected by stakeholders of poor cost management. However, research shows that a utility's unit cost trend is determined primarily by business conditions over which it has little control. These include the trends in input price inflation, average use, and the need for plant additions.
3) In a rising unit cost environment, the ability of a utility to "take a hair cut" between the historical test year and the rate year is limited. Long term performance gains involve upfront costs. Deferment of expenses lowers cost today at the expense of higher costs in the future.
4) Absent favorable operating conditions, the rise in a utility's unit cost due to changing business conditions may be so great that it is unable to earn its allowed rate of return under historical test year rates even with normal productivity gains. As Kamerschen and Paul comment, "while a utility is never guaranteed that it will earn its authorized fair rate of return, if no allowance is made for attrition or the other explosive elements, the utility is denied a realistic opportunity of earning the permitted rate of return."[11] In this situation, rates produced by historical test years are inherently unjust and unreasonable. This can prompt the investment community to downgrade its credit valuations, not just for the subject utility but for other utilities in the same jurisdiction.
5) Firms in competitive markets have ways of coping with rising unit costs that aren't available to utilities. The prices a competitive firm receives for its products will tend to rise at the same pace as the unit cost of its industry. Firms experiencing unit cost growth in excess of growth in sales prices can always scale back their offerings. A utility, in contrast, charges prices set by regulators which may not be reflective of unit cost trends. The utility is obligated to provide service even if prices are non-compensatory due to flawed ratemaking practices.

[11] Kamerschen and Paul *op. cit.* p. 23.

6) Unit cost pressures are not constant over time. Several years of flat unit cost can give way to a sustained period of rising unit cost. Thus, historical test years can produce reasonable results for many years and then become uncompensatory for many years due to rising unit cost. A utility's success at earning its allowed ROE during a string of recent years does not necessarily mean that a forward test year isn't warranted prospectively.
7) Forward test years have major advantages over historical test years in a rising unit cost environment. Rates are more likely to reflect unit cost conditions in the rate year and are, to this extent, more just and reasonable. Customers receive better price signals. Lower operating risk reduces the utility's cost of securing funds in capital markets. This benefit is especially important in periods of large plant additions, when high borrowing costs can have an especially large impact on the embedded cost of debt.
8) Whether or not unit cost is rising, historical test years do not adjust rates for slowdowns in volume growth, between the test year and the rate year, which are due to utility conservation initiatives. They therefore dampen utility incentives to encourage conservation.

1.2.2 Uncertainty

Opponents of forward test years often stress the uncertainty of cost and billing determinant forecasts. Future costs cannot be verified. The changes in business conditions that drive unit cost growth (*e.g.* inflation and the in service dates on looming plant additions) can be hard to predict accurately. The impact that changing business conditions have on unit cost is not always well understood. Opponents also argue that utilities are incented to exaggerate future cost growth and to understate future growth in billing determinants. Cost and billing determinants in a historical test year are, meanwhile, known with certainty.

On the other hand, the projections at issue in a forward test year concern business conditions that are at most two years into the future. A large chunk of future cost, the depreciation and the return on older plant, is known with considerable certainty at the time that the forecast is made. There are many aids in the preparation of credible forecasts, as we discuss further in Section 1.3. Consider also that volatile components of a utility's unit cost (*e.g.* expenses for pensions and uncollectible bills) are often subject to trackers that reduce or eliminate the risk of bad forecasts.

Current test years involve less forecasting uncertainty because the test year is only a year into the future at the time that the rate case is filed. Actual data for some or all months of the test year become available in the course of the proceeding. The accuracy of the methods used to forecast cost and billing determinants can thus be tested against their ability to predict the actuals in some months of the test year.

FTY projections are, in any event, quickly followed by actual data, and a utility that makes forecasts that are consistently biased in its favor will find that its forecasts are discounted in ratemaking. Biased forecasts can even jeopardize a regulator's willingness to use forward test years. The other stakeholders to the rate case process have incentives to bias cost and sales forecasts in the other direction. These circumstances reduce or eliminate the bias of the forecasts on which FTY rates are ultimately based. If the forecast of future cost and output is accurate, the utility will receive revenue that is exactly equal to its cost. FTY rates will be fair to the utility and ratepayer alike, whereas historical test year rates are likely to be biased in a rising (or falling) unit cost environment.

On balance then forward test year rates, while involving some uncertainty, are likely to be more reflective of future business conditions than are historical test year rates in a rising unit cost environment. The uncertainty involved in basing rates on FTYs is no greater than that involved in rate freezes and other kinds of multiyear rate plans that are often approved by regulators. The Michigan Public Service Commission ("PSC") commented, in a recent decision on an FTY rate filing for Consumers Energy, that

> The basis for using a forward test year is to address the problem of regulatory lag between past and future costs. While the advantage of historical data is its objective and verifiable nature, it lacks the necessary forward perspective required in a changing economic environment. An historical test year is by definition not timely and may fail to adequately consider future demands....What is gained by dealing with data that is "known and measurable" can be lost in forcing a utility to operate with outdated numbers.[12]

[12] Michigan PSC *Opinion and Order*, Case U-175645, November 2009.

1.2.3 Regulatory Cost

A third consideration in weighing the advantages of historical and forward test years is regulatory cost. The net impact of forward test years on regulatory cost is difficult to assess. Forward test year rate cases typically do involve higher cost than rate cases based on historical test years because of the need for forecasts.

On the other hand, a number of the major issues in a rate case, including the depreciation rates and the rate of return on common equity, are not markedly more complicated in a forward test year proceeding. Depreciation on existing plant is easy to predict once a depreciation rate is established. Some of the more uncertain components of cost and revenue may be subject to trackers that mitigate rate case controversy. The cost of FTY rate cases falls as jurisdictions gain experience with forecasted evidence. Consider also that in a rising unit cost environment rates based on forward test years can, by reducing earnings attrition, sometimes reduce the frequency of rate cases.

1.2.4 Operating Efficiency

The effect of alternative test year approaches on utility operating efficiency is also frequently discussed in debates on test year approaches. Opponents of forward test years sometimes argue that they weaken utility incentives to operate efficiently. In a rising unit cost environment, an expectation that rates are going to be non-compensatory might encourage utilities to tighten their belts. FTY opponents also argue that a utility wishing to inflate its cost in an historical test year, in an effort to create higher rates in the rate year, would incur a real cost to do so.

On the other hand, the notion that rate cases generally weaken utility performance incentives is a central result of regulatory economics and is not confined to future test years. When a utility is operating under a series of annual rate cases with historical test years, cost savings this year lead quickly to lower rates. The fact that a forward test year involves forecasts does not in and of itself weaken performance incentives. Forward test year forecasts are often linked to actual costs in one or more historical reference years, so the utility must once again incur a real cost if it wishes to bolster its argument for higher costs in the test year.

Consider also that when unit cost is rising, the non-compensatory rates yielded by forward test years may cause utilities to file rate cases more frequently. This weakens performance incentives, and senior managers devote less time to the utility's basic business of providing quality service at a reasonable cost. Analysis by PEG Research has revealed that reducing the frequency of rate cases from one to three years increases a utility's productivity performance by about 50 basis points annually in the long run.[13] We therefore do not expect utility operating incentives to differ significantly between historical and forward test years on balance.

It is, in any event, unreasonable for stakeholders and regulators to acquiesce in non-compensatory HTY rates on the grounds that they encourage utilities to trim "fat" if the existence of fat has not been demonstrated in the rate case. J. Michael Harrison, an administrative law judge with the New York PSC, commented in this regard in a 1979 article on forward test years that

> It is reasonable to set rates conservatively when company's management or operations are significantly and demonstrably poor… Evidence of general management inadequacy, however, is rarely seen in rate cases and … management normally will be striving to improve efficiency in periods of continuously rising costs. Regulatory commissions certainly have an obligation to monitor operations and management effectiveness, but it does not appear justifiable to indulge in a presumption, absent specific evidence to the contrary, that deficient earnings can be attributed to management shortcomings rather than to unfavorable operating conditions.[14]

1.2.5 Other Considerations

Here are some additional considerations that merit note in a discussion of forward test year pros and cons.

- Forward test years encourage the utility, other stakeholders, and the Commission to focus more attention on the utility's plans for the future. Undesirable trends, such as rising costs that reflect inadequate attention to productivity growth, can be recognized and discouraged in advance of their occurrence. Budgeting is apt to play a more central role in cost management.

[13] See, for example, "Incentive Plan Design for Ontario's Gas Utilities", a presentation made by the senior author in work for the Ontario Energy Board in November 2006.
[14] J. Michael Harrison, "Forecasting Revenue Requirements", *Public Utilities Fortnightly*, March 1979, p. 13.

- Forward test year rate cases sharpen the ability of the regulatory community to undertake and review statistical analyses of unit cost trends. These same skills are useful in the design of multiyear rate plans in which rates are adjusted automatically between rate cases to reflect changing business conditions. Multiyear rate plans can reduce regulatory cost and strengthen utility performance incentives, creating benefits that can be shared with customers.

1.3 Evidentiary Basis for FTY Forecasts

Good evidence on future costs and billing determinants is critical to the effectiveness of forward test year rate cases. The New York PSC stated, in an order rejecting a forward test year for New York State Electric and Gas in 1972, that

> To justify the commission in deviating from its long-standing policy of using an actual test year adjusted for known changes, there must be a full showing that such a change is a practical necessity. This showing must encompass the twin requirements of substantial accuracy and an impending, uncontrollable diminution in profitability.

We have already discussed at some length the kinds of conditions that can cause unit cost to rise between an historical test year and the rate year. We consider here kinds of evidence used in FTY rate cases that increase the confidence of regulators that forecasts are accurate.

Linkage to Historical Data

Utilities in forward test year rate cases usually file detailed and extensive evidence concerning cost and billing determinants in one or more historical reference years.[15] Data for these years are usually subject to normalization and annualization adjustments like those used in historical test year filings. The utility will then present evidence on expected changes in cost and billing determinants between the historical reference year and the test year.[16] Cost projections are often made for the same detailed Uniform System of Account categories that are used in historical test year rate cases. J. Michael Harrison commented in this regard in his 1979 article that "the New York commission's requirement that a verifiable nexus be established between a forecast and an historical base of actual experience is a sine qua non

[15] An historical reference year is sometimes called a "base period".
[16] This sometimes includes a forecast of cost during the rate case year (if different), which is sometimes called the "bridge year".

for forecasting revenue requirements. The burden of proving the reasonableness of its filing remains with the utility company."[17]

Indexation

Indexation is used by several utilities in FTY rate cases to escalate cost items for changing business conditions. Recall from Section 1.2.1 that the growth in the cost of a utility equals the inflation in the prices it pays for inputs plus the growth in its output less the trend in its productivity. The trend in the productivity of utilities tends to be similar to the growth in their output. Testimony just prepared by PEG Research for San Diego Gas & Electric reports that, for a national sample of power distributors, MFP averaged 0.88% annual growth from 1999 to 2008 while the number of customers served averaged 1.37% average annual growth.[18] An assumption that productivity growth equals output growth makes it possible to escalate cost from historical reference year(s) values by the forecasted growth in prices. This is the most common use of indexing in FTY forecasts.

The United States is fortunate to have available some of the best data in the world on utility input price trends. One company, Whitman, Requardt and Associates, has for decades published "Handy Whitman Indexes" of trends in the construction costs of both gas and electric utilities.[19] These are available for six geographic regions of the United States for detailed asset classes. Another company, Global Insight, has a *Power Planner* service that has forecasts, updated quarterly, of construction cost indexes. Global Insight also forecasts inflation in the prices of labor, materials, and services used by gas and electric utilities.[20] The materials and service ("M&S") price indexes are available for the detailed O&M expense categories that are itemized in the FERC's Uniform System of Accounts. Global Insight input price indexes have been used for many years to adjust revenue requirements in the multiyear rate plans of California gas and electric utilities.

Some utilities instead escalate O&M expenses in rate cases using familiar macroeconomic price indexes. The gross domestic product price index ("GDPPI") is often preferred for this purpose to the better known consumer price index because the GDPPI assigns less weight to price volatile commodities, such as food and energy, which do not

[17] J. Michael Harrison, *op. cit.*, p. 13.
[18] Mark Newton Lowry *et al.*, *Productivity Research for San Diego Gas & Electric,* August 2010.
[19] Whitman, Requardt & Associates LLP, "The Handy-Whitman Index of Public Utility Construction Costs".
[20] A discussion of an early use of detailed inflation forecasts in ratemaking is found in Michael J. Riley and H. Kendall Hobbs, Jr. "The Connecticut Solution to Attrition", *Public Utilities Fortnightly*, November 1982.

loom large in base rate input costs. Our research over the years has found that the GDPPI and CPI both tend to understate escalation in the prices of utility O&M inputs. One reason is that they are measures of inflation in the economy's prices of final goods and services and therefore reflect the productivity growth of the U.S. economy, which has been substantial in recent years. In a recent report for Hawaiian Electric, for instance, PEG found that from 1996 to 2007 the GDPPI averaged 2.21% average annual growth whereas an index of the O&M input prices paid by HECO averaged 3.05% average growth.[21] The GDPPI should therefore inspire confidence as an O&M escalator that often yields reasonable results for customers.

Simple Trend Analyses

Simple approaches to forecasting based on historical trends can, if well designed, strike a reasonable balance between the desire of regulators for accuracy and simplicity. For example, a given cost item can equal its adjusted value in the historical reference year, plus a one or two-year escalation for the average annual growth of this cost for a group of peer utilities in recent years. This approach is more sensible to the extent that the recent inflation, productivity, and output trends of the peers are similar to those that the subject utility will experience in the near future. A refinement on this general approach would be to assume a trend in cost *per customer* equal to the recent historical trend of peer utilities and then to reach cost by adding a forecast of the utility's own customer growth. Simple methods like these have counterparts for the forecasting of billing determinants. For example, the volume of residential sales in a future test year can be forecasted as the expected number of customers multiplied by the expected volume per customer, where the latter is allowed to differ from the normalized value(s) in the historical reference year(s) by its normalized trend in the last three years.

Budgeting

Some utilities use the same figures in forward test year filings that they use in their own budgeting process.

[21] Mark Newton Lowry *et al.*, *Revenue Decoupling for Hawaiian Electric Companies*, Pacific Economics Group, January 2009. pp. 65-66.

Econometric Modeling

Econometric modeling is used by several utilities in FTY cost and billing determinant projections. In an econometric model, the variable to be forecasted is posited to be a function of one or more external business conditions. Model parameters are estimated using historical data on the variable to be forecasted and the business conditions. A rich theoretical and empirical literature is available to guide model development. Given forecasts of the business conditions, the model can forecast how cost will grow between one or more historical reference years and the forward test year.

Benchmarking

Utilities can bolster the confidence of regulators in their FTY cost forecasts by benchmarking them using data from other utilities. A variety of benchmarking methods are available, ranging from econometric modeling to peer group comparisons that use simple unit cost metrics. Public Service of Colorado, for instance, recently filed a study in an FTY rate case filing that benchmarked their non-fuel O&M expense forecast.[22] The study used an econometric benchmarking model as well as unit cost metrics for a Western Interconnect peer group. The authors found that the forecasted expenses reflected a high level of operating efficiency.

[22] See Public Service Company of Colorado's Exhibit MNL-1 in docket 09AL-299E before the Public Utilities Commission of Colorado, filed October 13, 2009.

2. TEST YEAR HISTORY AND PRECEDENTS

2.1 A Brief History

Few states have laws on the books that mandate a particular test year approach. Statutes instead commonly feature more general provisions on regulation such as guidelines that rates be just and reasonable, that terms of service be non-discriminatory, and that service be of good quality. Flexibility with respect to test years is also encouraged by the Supreme Court's influential *Hope* decision, which held that

> The Commission was not bound to the use of any single formula or combination of formulae in determining rates. Under the statutory [Natural Gas Act] standard of "just and reasonable" it is the result reached and not the method which is controlling...If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial inquiry under the Act is at an end.[23]

Historical test years were nonetheless the norm in the early history of electric utility rate cases, and this reflects the prevalence over many years of business conditions that were conducive to slow unit cost growth. Slow price inflation was a contributing factor. Table 1 shows the history of GDPPI inflation in the United States from 1930 to 2009. It can be seen that inflation was negative in most years of the 1930s but was brisk during World War II, the immediate post war years, and in 1951. After the Korean War, the table shows that GDPPI inflation averaged only 1.74% annually in the 1952-1965 period.

Table 1 also shows the trend in the MFP index for the electric, gas, and sanitary sector of the U.S. economy. This index was computed by the U.S. Bureau of Labor Statistics ("BLS") for many years and was sensitive to the productivity trend in the electric utility industry due to the industry's disproportionately large size. It can be seen that the productivity growth of the electric, gas, and sanitary sector was extraordinarily rapid during the 1952-65 period, averaging 4.13% per annum. This was more than double the MFP index trend for the U.S. non-farm private business sector as a whole.

Under these favorable operating conditions, the unit cost of the electric utilities was typically stable or declining.[24] Rate cases were rare and historical test years were the norm in the rate cases that did occur. Regulators gained confidence that the matching principle could

[23] 320 U.S. 591.
[24] See Paul Joskow, "Inflation and Environmental Concern: Structural Change in the Process of Public Utility Price Regulation", *Journal of Law and Economics*, 1974 for an insightful discussion of some of this history.

Table 1

U.S. Inflation and Productivity Trends

		GDP Price Index		Multifactor Productivity: Private Non-Farm Business		Multifactor Productivity: Electric, Gas & Sanitary Sector	
	Year	Index	Growth	Index	Growth	Index	Growth
	1929	10.6		NA	NA	NA	NA
	1930	10.2	-3.94%	NA	NA	NA	NA
	1931	9.2	-10.45%	NA	NA	NA	NA
	1932	8.1	-12.08%	NA	NA	NA	NA
	1933	7.9	-2.66%	NA	NA	NA	NA
	1934	8.3	4.78%	NA	NA	NA	NA
	1935	8.5	1.97%	NA	NA	NA	NA
	1936	8.6	1.09%	NA	NA	NA	NA
	1937	8.9	3.61%	NA	NA	NA	NA
	1938	8.7	-1.90%	NA	NA	NA	NA
	1939	8.6	-1.27%	NA	NA	NA	NA
	1940	8.7	0.87%	NA	NA	NA	NA
	1941	9.2	6.32%	NA	NA	NA	NA
	1942	10.0	7.91%	NA	NA	NA	NA
	1943	10.6	5.47%	NA	NA	NA	NA
	1944	10.8	2.37%	NA	NA	NA	NA
	1945	11.1	2.52%	NA	NA	NA	NA
	1946	12.4	10.90%	NA	NA	NA	NA
	1947	13.7	10.54%	NA	NA	NA	NA
	1948	14.5	5.52%	53.0	NA	37.1	NA
	1949	14.5	-0.06%	53.8	1.41%	37.7	1.66%
	1950	14.6	0.78%	57.2	6.08%	40.5	7.20%
	1951	15.6	6.66%	58.6	2.47%	44.4	9.16%
	1952	16.0	2.15%	59.0	0.67%	46.3	4.19%
	1953	16.2	1.26%	59.9	1.59%	48.1	3.80%
	1954	16.3	1.01%	59.9	-0.12%	50.0	4.01%
	1955	16.6	1.42%	62.4	4.15%	53.9	7.41%
	1956	17.1	3.39%	61.6	-1.33%	56.6	4.99%
	1957	17.7	3.44%	62.3	1.11%	58.7	3.59%
	1958	18.1	2.28%	62.4	0.29%	60.3	2.71%
	1959	18.3	1.13%	65.2	4.35%	64.1	6.10%
	1960	18.6	1.39%	65.5	0.51%	66.0	2.95%
	1961	18.8	1.12%	66.6	1.54%	67.7	2.41%
	1962	19.1	1.36%	68.9	3.46%	70.9	4.68%
	1963	19.3	1.05%	70.8	2.68%	72.3	2.02%
	1964	19.6	1.54%	73.5	3.72%	76.1	5.02%
	1965	19.9	1.80%	75.6	2.82%	79.2	4.00%
	1966	20.5	2.80%	77.7	2.82%	82.4	4.07%
	1967	21.1	3.03%	77.8	0.06%	85.0	3.01%
	1968	22.0	4.16%	79.8	2.56%	88.8	4.42%
	1969	23.1	4.82%	79.2	-0.76%	91.2	2.69%
	1970	24.3	5.14%	78.8	-0.50%	92.7	1.56%
	1971	25.5	4.88%	81.3	3.11%	93.8	1.21%
	1972	26.6	4.22%	83.7	2.87%	95.4	1.70%
	1973	28.1	5.39%	86.1	2.87%	97.2	1.88%
	1974	30.7	8.66%	83.2	-3.35%	94.0	-3.31%
	1975	33.6	9.06%	83.6	0.43%	94.2	0.18%
	1976	35.5	5.58%	86.8	3.77%	95.4	1.28%
	1977	37.8	6.17%	88.1	1.46%	95.2	-0.25%
	1978	40.4	6.78%	89.4	1.47%	95.1	-0.04%
	1979	43.8	7.99%	88.8	-0.67%	94.0	-1.21%
	1980	47.8	8.75%	86.9	-2.20%	93.5	-0.53%
	1981	52.3	9.01%	86.5	-0.42%	93.5	0.04%
	1982	55.5	5.92%	83.5	-3.59%	92.6	-1.04%
	1983	57.7	3.87%	86.6	3.68%	91.4	-1.23%
	1984	59.8	3.69%	88.7	2.35%	94.5	3.34%
	1985	61.6	2.98%	89.2	0.65%	94.4	-0.16%
	1986	63.0	2.20%	90.6	1.47%	94.7	0.35%
	1987	64.8	2.76%	90.7	0.16%	94.8	0.04%
	1988	67.0	3.38%	91.7	1.04%	98.5	3.84%
	1989	69.5	3.71%	91.7	0.00%	98.9	0.44%
	1990	72.2	3.80%	92.0	0.40%	100.4	1.49%
	1991	74.8	3.47%	91.3	-0.80%	100.2	-0.18%
	1992	76.5	2.35%	93.5	2.39%	100.0	-0.21%
	1993	78.2	2.18%	93.7	0.18%	102.6	2.52%
	1994	79.9	2.08%	94.4	0.78%	103.2	0.67%
	1995	81.5	2.06%	94.5	0.09%	105.6	2.22%
	1996	83.1	1.88%	95.8	1.42%	106.9	1.24%
	1997	84.6	1.76%	96.5	0.66%	106.9	-0.02%
	1998	85.5	1.12%	97.7	1.28%	107.0	0.11%
	1999	86.8	1.46%	99.0	1.27%	NA	NA
	2000	88.6	2.15%	100.0	1.05%	NA	NA
	2001	90.7	2.24%	100.4	0.39%	NA	NA
	2002	92.1	1.60%	102.5	2.08%	NA	NA
	2003	94.1	2.13%	105.2	2.60%	NA	NA
	2004	96.8	2.80%	108.0	2.60%	NA	NA
	2005	100.0	3.28%	109.3	1.26%	NA	NA
	2006	103.3	3.21%	109.9	0.51%	NA	NA
	2007	106.2	2.82%	110.1	0.21%	NA	NA
	2008	108.5	2.11%	111.4	1.13%	NA	NA
	2009	109.7	1.16%	NA	NA	NA	NA
Averages	1952-1965		1.74%		1.82%		4.13%
	1973-1981		7.49%		0.37%		-0.22%
	1982-1991		3.58%		0.54%		0.69%
	1992-2003		1.92%		1.18%		NA
	2004-2008		2.84%		1.14%		NA

yield just and reasonable rates.

The unit cost growth of electric utilities accelerated in the late 1960s and remained high for about two decades thereafter for several reasons.

- Price inflation accelerated, spurred initially by the Vietnam War and subsequently by the oil price shocks of 1974-75 and 1979-80. During the 1973-81 period, GDPPI inflation averaged 7.49% annually. Inflation thereafter slowed but still averaged 3.58% annually during the 1982-91 period.
- Rising utility rates and slowing economic growth slowed growth in use per customer.
- Utility productivity growth, far from keeping pace with inflation, slowed substantially falling by 0.22% annually on average in the 1973-1981 period and averaging only 0.69% annual growth in the 1982-91 period. Factors contributing to the slowdown included the exhaustion of scale economies by some of the nation's larger electric utilities and the propensity of some utilities to continue making major plant additions despite slower demand growth.

Under these changed conditions, utilities in the two decades after 1967 sought financial relief by filing frequent rate cases. However, many utilities found that they could not earn their allowed ROE under newly established rates. One author commented in 1974, a particularly bad year, that "it would be difficult, if not impossible, to find a utility which has been able in the first year in which a rate increase was in effect to earn the return on which the rate increase was predicted".[25] A study found that the earned ROE on equity in the electric utility industry was more than 200 basis points below the allowed rate of return on average in 1974, 1979, and 1980.[26] Interest coverage fell markedly for many utilities, limiting their ability to issue new debt. Financing of new investments required greater reliance on issuance of new common stock, and the value of stock fell below the book value of assets in many cases. Articles about attrition and regulatory lag appeared with regularity in the trade press.[27]

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[25] W. Truslow Hyde, "It Could Not Happen Here – But it Did", *Public Utilities Fortnightly*, June 1974.
[26] Walter G. French, "On the Attrition of Utility Earnings", *Public Utilities Fortnightly*, February 1981.
[27] See, as another example, Theodore F. Brophy, "The Utility Problem of Regulatory Lag", *Public Utilities Fortnightly*, January 1975.

Regulators responded to this situation with an array of measures, some of which had been used at one time or another in the past. The measures included interim rate increases; the inclusion of construction work in progress ("CWIP") in rate base; more widespread use of fuel adjustment clauses; the addition of an "attrition allowance" to the target ROE, and more widespread use of forward and hybrid test years. Adopters of FTYs in these years of brisk unit cost growth included the Federal Energy Regulatory Commission ("FERC") and state commissions in California, Connecticut, Florida, Georgia, Hawaii, and New York.

Some of these states initially experimented with hybrid test years which, as we have noted, make it possible to update rate filings as actual data for the later months of the test year become available. J. Michael Harrison explained in his 1979 article some grounds for dissatisfaction with hybrid test year experiments:

> Parties charged with testing or contesting a utility's rate case presentation were faced with figures and issues that changed and shifted through all phases of the case. Even after their direct evidentiary presentations were made, these parties were faced with a required reevaluation of their positions and the possibility that a host of new issues would be created by emerging actual data. The commission staff, which in New York bore the brunt of this burden, faced an almost impossible task of analyzing new data, even as its case went to the administrative law judge or commission for decision. It became clear that the value of the already completed hearings was being seriously undermined. [28]

The New York Commission decided in 1977 to move to fully forecasted test years consisting of the first twelve months expected under the new rates.[29]

The need for forward test years subsided with the slowdown of unit cost growth that occurred in the electric utility industry in the 1990s. This slowdown was driven primarily by a partial reversal of the business conditions that had previously caused brisk unit cost growth. During the 1992-2003 period GDPPI growth averaged only 1.92% per year. Yields on newly issued long term bonds fell substantially as the market lowered its expectation of future inflation. The productivity growth of the electric, gas, and sanitary sectors increased modestly, averaging 0.94% annually during the 1992-98 period, a trend similar to that of the private business sector. One reason for the productivity rebound was a slowdown in plant additions as the industry increased utilization of the generation and transmission capacity

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[28] J. Michael Harrison, *op. cit.*, p. 12.
[29] New York Public Service Commission, "Statement of Policy on Test Periods in Major Rate Proceedings", November 1977.

built in the previous twenty years. Several electric utilities operated under base rate freezes during these years. Their willingness to agree to freezes reflected in part the generally favorable unit cost conditions but sometimes also reflected an expected spurt of productivity growth due to participation in mergers or acquisitions.

Interest in forward test years has renewed for electric utilities in recent years due to a renewed growth in unit cost, which is discussed in more detail in Section 3.1 below. We note here that general inflation accelerated after 2003, with GDPPI growth averaging 2.84% annually during the 2004-2008 period. Inflation slowed in 2009 but will likely rebound as the world economy recovers from the recession. Utility investment needs increased during the period to replace aging facilities, reverse declining generation capacity margins, implement "smart grid" technologies, and meet the rising demand for transmission services to reach remote sources of renewable energy and promote bulk power market competition. Growth in average use has slowed with slowing economic growth and new initiatives to promote energy conservation.

Interest in forward test years has been especially keen in the American west. Brisk economic growth in most western states has increased the need for plant additions. Here is a brief summary of changing test year policies in selected states.

Colorado

In Colorado, the commission rejected an FTY request by Public Service of Colorado in 1993 but acknowledged that "the purpose of a test year is to provide, as closely as possible, an interrelated picture of revenue, expense, and investment reasonably representative of the interrelationships that will be in place at the time the new rates proposed in a rate case will be in effect".[30] The commission did not forbid FTY evidence and encouraged the company to consider a *current* test year, an option that it said "might provide a promising mixture of comfort and flexibility acceptable to the parties and the commission.[31]

Public Service filed FTY evidence in a 2008 rate case but the approved settlement in the case was based on historical test year evidence.[32] In May 2009, Public Service again filed FTY evidence as it sought to include in its cost of service some major plant additions,

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[30] PUC Colorado Decision No. C93-1346 in Docket No. 93S-001EG, October 1993, pp. 21-22.
[31] *Ibid*, p. 40.
[32] Docket No. 08S-520E.

including a new coal-fired generating unit and a smart grid build out, which would come online in late 2009 or 2010.[33] A settlement agreement, approved with modifications, based the revenue requirement on a historical 2008 test year with extraordinary adjustments to include the cost of the impending major plant additions. The company agreed not to file a rate case for two years.

This settlement also indicated an expectation that the company would file FTY evidence in its next rate case. It commits the company to provide companion historical test year evidence, including a detailed analysis of deviations between HTY and FTY results. The Company agreed to work with interested parties on reporting requirements with respect to such deviation analyses in order to facilitate the review of future cases.

Idaho

In Idaho the largest electric utility, Idaho Power, successfully used a hybrid test year in a rate case filing in 2003. In a 2009 filing it successfully used a test year beginning in January 2009.[34] This was essentially a current FTY.

Illinois

The move to forward test years is not confined to western states. Illinois utilities have long retained the right to file FTY rate cases and Integrys recently did so successfully for its North Shore Gas and Peoples Gas Light and Coke units.[35] Peoples has a major need to increase replacement investments in its aging system, which serves Chicago.

Michigan

In Michigan, utilities have used varied test year approaches. Recent legislation (2008 PA 286) explicitly sanctions forward test year filings. The law also permits utilities to "self-implement" interim rates if rate cases aren't resolved in 180 days. Consumers Energy and Detroit Edison have recently filed FTY rate cases successfully.

New Mexico

In New Mexico a bill was passed in 2009 that allows the state commission to use forward test years in electric and gas rate proceedings. The bill states that

[33] Docket No. 09AL-299E.
[34] Docket No. IPC-E-09-10.
[35] Dockets No. 09-0166 and 09-0167.

> In making a determination of just and reasonable rates of a utility, the commission shall select a test period that, on the basis of substantial evidence in the whole record, the commission determines best reflects the conditions to be experienced during the period when the rates determined by the commission take effect. If a utility proposes a future test period, a rebuttable presumption shall exist that a future test period best reflects the conditions to be experienced during the period when the rates determined by the commission take effect.[36]

The Bill was supported by majority voice vote of the New Mexico Public Regulation Commission. Public Service of New Mexico recently filed an FTY rate case.

Utah

Utah statutes were amended in 2003 to allow hybrid and forward test years for gas and electric utilities. The amended statutes state that

> If in the commission's determination of just and reasonable rates the commission uses a test period, the commission shall select a test period that, on the basis of the evidence, the commission finds best reflects the conditions that a public utility will encounter during the period when the rates determined by the commission will be in effect.[37]

The choice of a test year has since become an issue in the early stages of rate cases. In 2004, for example, PacifiCorp [d/b/a Rocky Mountain Power ("RMP")] filed a rate case based on a forward test year. It defended the FTY on the grounds that its costs were increasing due to rapid system growth and a plan to improve system reliability. An unopposed Test Year Stipulation acknowledged that the FTY was the most sensible test year for this case and provided for a task force to address test period procedural issues. The terms of the stipulation were not binding for future proceedings. The Commission commented in its order approving the stipulation that

> Each case needs to be considered on its own merits and the test period selected should be the most appropriate for that case. The test period selected for a utility in a particular case may not be appropriate for another utility or even the same utility in a different case. Some of the factors that need to be considered in selecting a test period include the general level of inflation, changes in the utility's investment, revenues, or expenses, changes in utility services, availability and accuracy of data to the parties, ability to synchronize the utility's investment, revenues, and expenses, whether the utility is in a cost

[36] New Mexico Senate Bill 477, 2009.
[37] Utah Code Annotated Section 54-4-4 (3).

> increasing or cost declining status, incentives to efficient management and operation, and the length of time the new rates are expected to be in effect.[38]

In December 2007, RMP filed a rate case based on a forward test year beginning in July 2008.[39] The Commission instead chose a current FTY beginning in January 2008. The Company was compelled to update its testimony to reflect the sanctioned test year. In its final decision in the case, the Commission instructed the Company to file a semi-annual "variance report" comparing its actual operating results to its rate case forecasts.

In April 2009, RMP filed a notice of intent to file a rate case in June 2009 based on a forward test year beginning in January 2010. A high level of capital investment was emphasized in advocating the need for an FTY. The Commission approved a Test Period Stipulation providing for a current FTY beginning in June 2009. The decision notes that the Division of Public Utilities argued in support of the stipulation that

> the stipulated test period, combined with the opportunity for the Company to request alternative cost recovery treatment for major plant additions, will balance the interest of the Company in reducing regulatory lag and the interests of customers by reducing the risks associated with the timing and cost of major capital additions projected to be completed 18 months into the future.[40]

Wyoming

In Wyoming, a stipulation approved in 2006 provided that RMP (d/b/a PacifiCorp) could, on a one time trial basis, file a rate case based on a forward test year. RMP filed a rate case in June 2007 using an FTY ending in August 2008. The Wyoming Public Service Commission approved a rate settlement based on the forecasts for this test year. They indicated a willingness to hear forward test year evidence in the general rate case but required the company to submit conventional historical test year evidence as well. The Commission also directed the company to prepare a report comparing its actual cost and billing determinants for the current test year to those which the company forecasted in the proceeding. In the event, the variance report stated that the company had overestimated its

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[38] Public Service Commission of Utah, "Order Approving Test Period Stipulation", Docket 04-035-42, October 2004.
[39] Public Service Commission of Utah, "Order on Test Period", Docket No. 07-035-93, February 2008.
[40] Public Service Commission of Utah, "Report and Order on Test Period Stipulation", Docket No. 09-035-23, June 2009.

cost by a small amount but overestimated its revenue and on balance did not earn its allowed rate of return for the year.

In July 2008, RMP filed a new rate case with a current FTY ending in June 2009 using calendar 2007 as a historical reference year. The company emphasized in its case the inability of historical test year rates to compensate the utility for sizable new investments in its system. The Commission approved a settlement that included a provision that RMP file historical test year evidence as well as any FTY evidence in its next rate proceeding.[41] RMP will continue to file operating results that will permit the Commission to review the accuracy of its FTY forecasts.

2.2 Current Status

Table 2 and Figure 1 detail the test year approaches that are currently in use across the United States. It can be seen that historical test years are now used by most large IOUs in less than twenty U.S. jurisdictions. Nearly as many jurisdictions (AL, CA, CT, FL, GA, HI, ME, MI, MN, MS, NY, OR, RI, TN, WI, and the FERC) use forward test years routinely, at least for larger utilities. Forward test years are also used in several Canadian jurisdictions. Four jurisdictions (AR, OH, NJ, & PA) use hybrid test years. An additional 13 jurisdictions are not neatly categorized. Here are some examples.

- Large utilities in Illinois, Kentucky, Maryland, and North Dakota utilities use various test years.
- As previously noted, test years used by utilities in Utah and Wyoming depend on conditions at the time of filing and New Mexico is heading in that direction.

2.3 Conclusions

In Section 1.2 we noted that the matching principle used in historical test year rate cases is based on the assumption that growth in billing determinants matches cost growth so that unit cost is stable. This is true when growth in utility productivity and average use somehow combine to offset the cost impact of input price growth. We report in this chapter that conditions like these have not been normal for electric utilities since the 1960s. Periods of unit cost stability can still occur, but are apt to be followed by periods of rising unit cost.

[41] Wyoming PSC Docket Number 20000-333-ER-08 (Record No. 11824), May 2009.

Table 2

Test Year Approaches of U.S. Jurisdictions

Forward (16)

State	Notes
Alabama	Alabama Power's Rate Stabilization and Equalization Factor is forward looking.
California	
Connecticut	Cost is based on a historical test year that is escalated to a future rate year.
FERC	Rate cases use forward test years while formula rate plans tend to use HTYs.
Florida	
Georgia	
Hawaii	
Maine	Cost is based on a historical test year that is escalated to a future rate year.
Michigan	
Minnesota	
Mississippi	
New York	
Oregon	
Rhode Island	Cost is based on a historical test year that is escalated to a future rate year.
Tennessee	
Wisconsin	

Hybrid (4)

State	Notes
Arkansas	
Ohio	
New Jersey	
Pennsylvania	

Transitional/Varying (13)

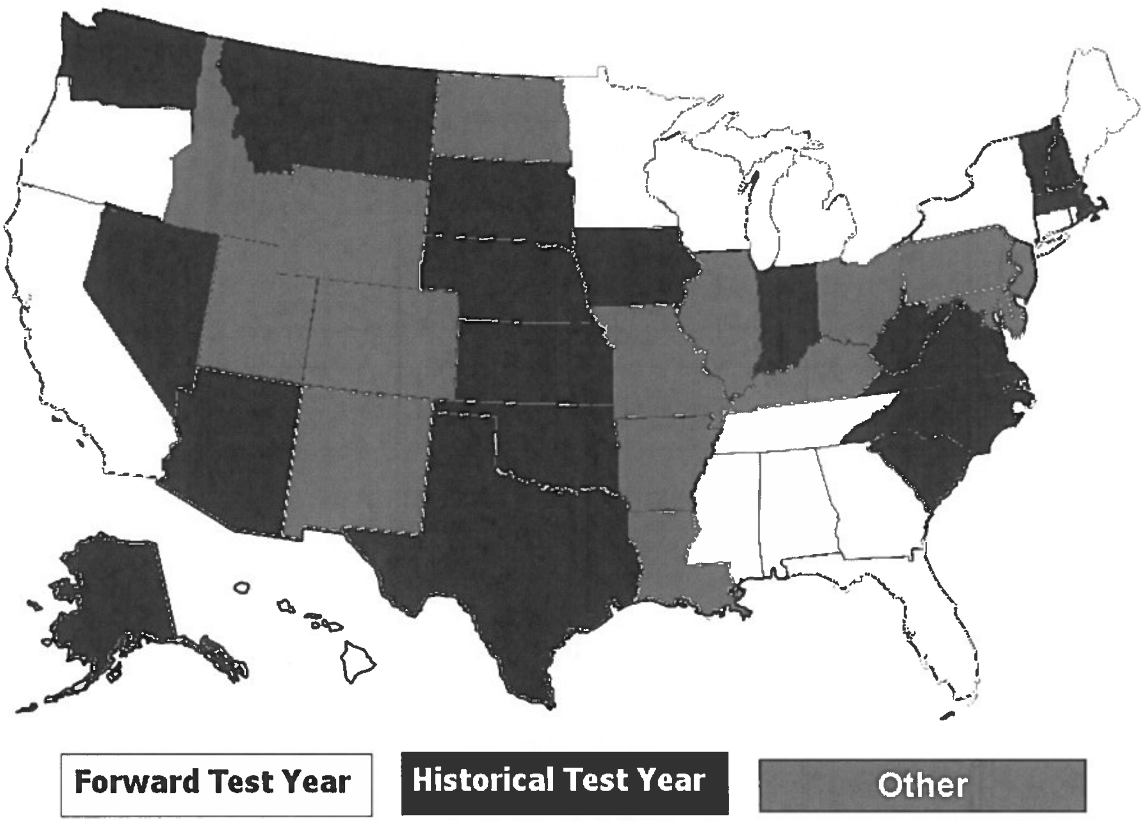
Utility Name	Notes
Colorado	Public Service of Colorado can file FTY evidence. No FTY rates have yet been approved but the most recent case made extraordinary HTY adjustments.
District of Columbia	PEPCO has filed rate cases using both hybrid and historical test years recently.
Delaware	Before restructuring FTY filings were common, but companies have used HTY in recent filings.
Idaho	
Illinois	Historic test years are the norm in IL. However, utilities have the right to make FTY filings and an FTY was accepted in a recent rate case of the Integrys gas utilities.
Kentucky	FTYs are legally authorized, but only Duke Energy has utilized them to date.
Louisiana	Cleco Power frequently uses hybrid test years. Entergy New Orleans recently had a hybrid test year approved via settlement.
Maryland	Baltimore Gas & Electric tends to file hybrid test years while other utilities tend to file historical test years.
Missouri	Utilities have the option to file hybrid year forecasts that are trued up during the course of the proceeding.
New Mexico	Recently passed law allows for use of FTY, but no rate case with an FTY has yet been approved.
North Dakota	Utilities use various test years including FTYs.
Utah	Test year selection is part of the rate case and can be contested. Several recent rate cases have used FTYs.
Wyoming	Rocky Mountain Power has recently had FTYs approved.

Historical (19)

Utility Name	Notes
Alaska	
Arizona	
Indiana	
Iowa	
Kansas	
Massachusetts	
Montana	
Nebraska	Nebraska has no electric IOUs in its jurisdiction. Gas companies are legally authorized to use FTYs, but no gas company has had FTY rates approved.
Nevada	
New Hampshire	
North Carolina	
Oklahoma	
South Carolina	
South Dakota	
Texas	
Vermont	
Virginia	
Washington	
West Virginia	

Figure 1

Map of Jurisdictions by Approved Test Year



Numerous regulators have moved away from historical test years in periods when unit cost is rising. Historical test year jurisdictions are now in the minority.

3. EMPIRICAL SUPPORT FOR FORWARD TEST YEARS

3.1 Unit Cost Trends of U.S. Electric Utilities

In Section 1.2 we detailed the key role that the trend in the unit cost of utilities has in determining the reasonableness of historical test years and the need for forward test years. In original research for this paper, we have calculated the unit cost trends of a sample of vertically integrated electric utilities ("VIEUs"). In this section, we explain our research methods in some detail before discussing the results.

3.1.1 Data

The primary source of utility cost date used in the study was the FERC Form 1. Major investor-owned electric utilities in the United States are required by law to file this form annually. Data reported on Form 1 must conform to the FERC's Uniform System of Accounts. Details of these accounts can be found in Title 18 of the Code of Federal Regulations.

Unit cost calculations also require data on billing determinants. Data on the number of customers served were drawn from FERC Form 1. Data on delivery volumes were drawn from Form EIA 861. The FERC Form 1 and Form EIA 861 data used in this study were gathered by SNL Financial, a respected commercial vendor.

Data were considered for inclusion in the sample from all major investor-owned VIEUs that did not offer gas distribution service or sell or spin off the bulk of their transmission assets in recent years. To be included in the study the data were required, additionally, to be plausible and not unduly burdensome to process. Data from the thirty four companies listed in Table 3 were used in the unit cost research. The sample period was 1996-2008. The year 2008 is the latest for which the requisite data were available when the study was prepared.

Supplemental data sources were used to measure input price trends. Handy Whitman indexes were used to measure electric utility construction cost trends. Global Insight indexes were used to measure trends in the prices of electric utility materials and services. Employment cost indexes prepared by the BLS were used to measure trends in labor prices. Regulatory Research Associates data was used to measure trends in target ROEs approved by regulators.

Table 3

Utilities Included in the Unit Cost Research

Company
Alabama Power
Appalachian Power
Arizona Public Service
Black Hills Power
Carolina Power & Light
Cleco Power
Columbus Southern Power
Dayton Power and Light
Duke Energy Carolinas
Empire District Electric
Entergy Arkansas
Florida Power & Light
Florida Power
Georgia Power
Gulf Power
Idaho Power
Indianapolis Power & Light
Kansas City Power & Light
Kentucky Power
Kentucky Utilities
Minnesota Power
Mississippi Power
Nevada Power
Ohio Power
Oklahoma Gas and Electric
Otter Tail Power
PacifiCorp
Portland General Electric
Public Service Company of Oklahoma
Southwestern Electric Power
Southwestern Public Service
Tampa Electric
Tucson Electric Power
Virginia Electric and Power

Number of utilities in sample: 34

3.1.2 Definition of Unit Cost

In Section 1.2.1 we discussed a measure of unit cost growth that is relevant in the appraisal of test years. It is constructed by taking the difference between growth in the net cost of base rate inputs and the growth in an index of utility billing determinants. For each sampled utility, we calculated the total cost of base rate inputs net of taxes as the sum of non-energy O&M expenses, depreciation, amortization, and return on rate base. Non-energy O&M expenses were calculated as total O&M expenses less customer service and information expenses and energy expenses that included those for steam power generation fuel, nuclear power generation fuel, other power generation fuel, and purchased power.[42] [43]

Return on rate base was calculated as the value of the rate base times a weighted average cost of capital ("WACC"). In constructing the WACC we assumed 50/50 weights for debt and common equity. The rate of return on debt was calculated as the ratio of the interest payments of electric utilities to the value of their debt as reported on the FERC Form 1. The ROE was calculated as the average applicable allowed ROEs of electric utilities as reported by Regulatory Research Associates.[44] The rate base for each utility was calculated as its net plant value less net accumulated deferred income taxes plus the value of its fuel, material, and supply inventories.

We reduced the base rate cost thus calculated by two kinds of "non-core" revenues, as is common in the calculation of retail base rate revenue requirements. One item deducted was Other Operating Revenue. This is the revenue from miscellaneous goods and services that include bulk power wheeling. The other component of non-core revenues was an estimate of the margin from power sales for resale.[45]

The growth in the billing determinant index used in our study is a weighted average of the growth in important billing determinants of electric utilities. The determinants used in index construction were the numbers of residential, commercial, and other retail customers

[42]Customer service and information expenses were excluded because they tended to rise over the sample period due to expanding demand-side management programs. The cost of DSM programs is typically recovered using tracker-rider mechanisms.

[43] We also excluded the Other Expenses category of Other Power Supply Expenses. We believe that large and volatile commodity-related costs are sometimes reported in this category.

[44] In this calculation, we assumed that the target ROE approved for a utility in its most recent rate case was applicable until a new target ROE was approved.

[45] These margins were computed as the difference between sales for resale revenue and an estimate of the energy commodity costs used in power supply.

and the corresponding delivery volumes.[46] We weather normalized the volumes using econometric demand research. In constructing the index, the trends in the billing determinants thus assembled were weighted by our estimates of the typical shares of individual billing determinants in the base rate revenue requirements of VIEUs.[47] The estimates were drawn from a perusal of recent VIEU rate case filings.

3.1.3 Unit Cost Results

Unit Cost Trends

The average annual trends of the sampled utilities in their cost, billing determinants, and unit cost can be found in Table 4 and Figure 2. It can be seen that unit cost declined by a modest 0.78% annually on average in the 1996-2002 period as average growth in billing determinants exceeded average growth in cost. The average growth in unit cost was positive in only one year of this period. These results suggest that, under typical operating conditions, historical test years would have yielded compensatory outcomes in rate cases during this period.

In the 2003-2008 period, on the other hand, it can be seen that unit cost grew briskly, averaging about 2.31% annually. Utilities experienced unit cost growth on average in every year of the period. Cost averaged 1.98% annual growth from 1996 to 2002 and 4.36% annual growth thereafter. The normalized growth of billing determinants averaged 2.75% per annum through 2002 but only 2.05% per annum thereafter. Thus, growth in billing determinants slowed despite marked acceleration of cost growth.

Earnings Impact

To consider the earnings attrition resulting from 2.3% annual unit cost growth, consider that if the typical company in the sample earned its target ROE it would constitute about 13% of the total cost of its base rate inputs. Assuming two years of 2.3% unit cost growth, revenue based on prices reflecting only the normalized business conditions of the historical test year would be expected to result in a 4.45% base rate revenue shortfall. If there was no tax adjustment, this would reduce the return on equity by about 35%. Assuming

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[46] The retail peak demands of commercial and industrial customers are also important billing determinants but data on these were unavailable.

[47] We assigned the base rate revenue shares corresponding to demand charges to the "other retail" delivery volume, expecting that these volumes have trends that are similar to those of demand charge billing determinants.

Table 4

Trends in the Unit Cost of US Vertically Integrated Utilities

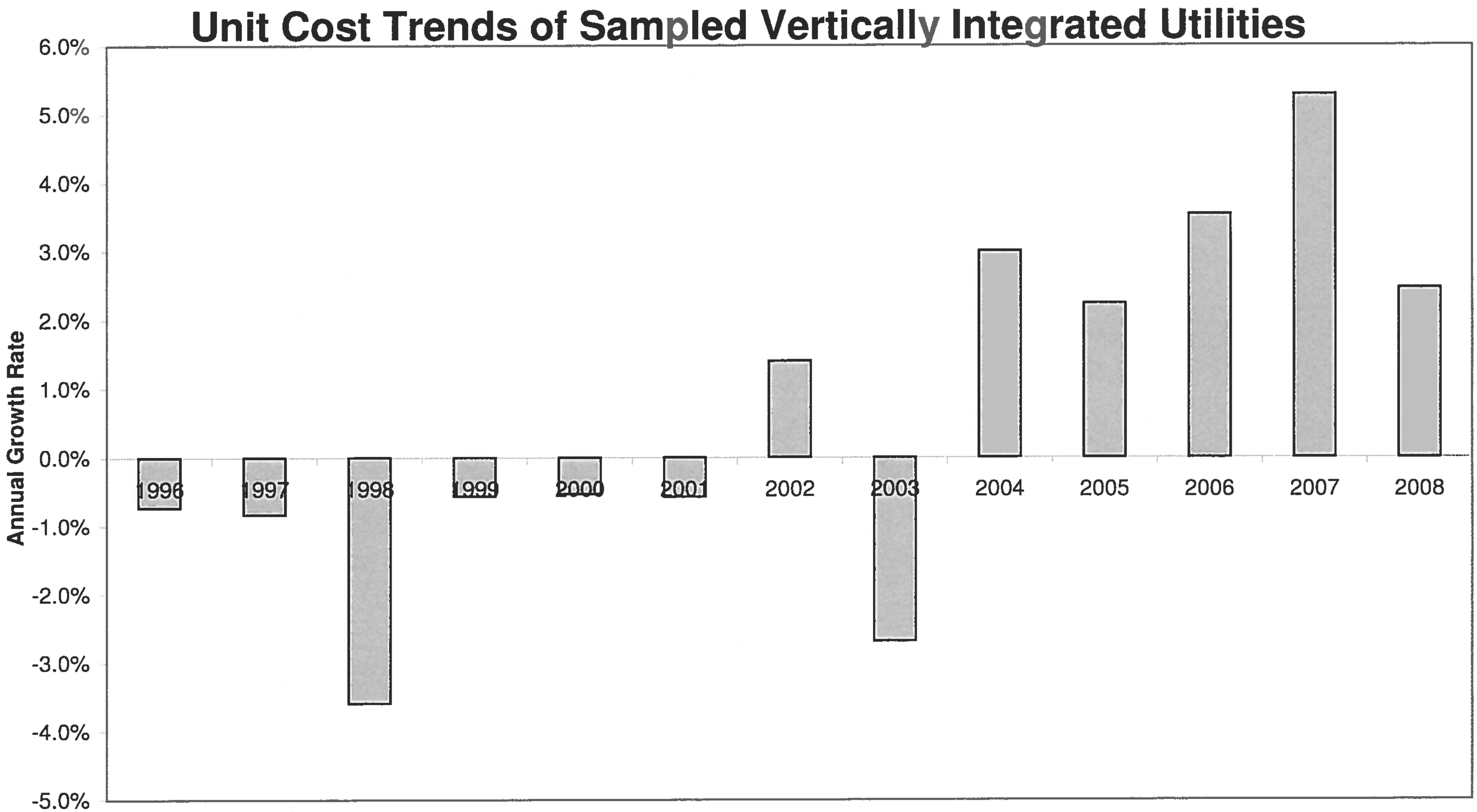
Sample Average Annual Growth Rates, Unweighted

Year	Cost[1]	Billing Determinants[2]	Unit Cost
1996	2.8%	3.5%	-0.7%
1997	1.4%	2.2%	-0.8%
1998	-0.7%	2.9%	-3.6%
1999	2.5%	3.0%	-0.6%
2000	3.4%	4.0%	-0.5%
2001	0.9%	1.4%	-0.6%
2002	3.6%	2.2%	1.4%
2003	1.6%	4.3%	-2.7%
2004	4.6%	1.6%	3.0%
2005	4.0%	1.8%	2.2%
2006	5.0%	1.5%	3.5%
2007	7.9%	2.6%	5.3%
2008	3.0%	0.5%	2.5%
Average Annual Growth Rates			
1996-2008	**3.08%**	**2.43%**	**0.65%**
1996-2002	**1.98%**	**2.75%**	**-0.78%**
2003-2008	**4.36%**	**2.05%**	**2.31%**

[1] The net cost formula is (Total O&M Expenses - Energy O&M Expenses - Customer Service and Information Expenses) + (Depreciation + Amortization + WACC x Rate Base) - (Other Operating Revenues + Estimated Resale Margin). The source of the cost data is FERC Form 1.

[2] The annual growth in billing determinants is a weighted average of the growth in residential, commercial, and other retail delivery volumes and customers served. The weights are shares in the base rate revenue requirement that are typical of vertically integrated electric utilities. Volumes were weather normalized by PEG Research using econometric demand modelling. The source of the raw volume data is Form EIA 861. The source of the customer data is FERC Form 1.

Figure 2


Unit Cost Trends of Sampled Vertically Integrated Utilities
Annual Growth Rate
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
-1.0%
-2.0%
-3.0%
-4.0%
-5.0%
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

an allowed ROE of 11%, this would mean a drop in ROE of around 375 basis points before tax adjustments. While lower income taxes would mitigate the earnings impact, we may conclude from this analysis that historical test years would have been inherently non-compensatory for a utility operating under the *typical* business conditions facing VIEUs in recent years. Results would be much worse for utilities facing more pronounced unit cost pressures due, for example, to an accelerated program of replacement capex or a large scale DSM program.

Unit Cost Drivers

Input Prices Our discussion in Section 1.2.1 contained the result that input price inflation, productivity growth, and the trend in average use were key drivers of unit cost growth. We calculated for this report indexes of the inflation in the prices of base rate inputs faced by the sampled VIEUs. The growth rates of the summary input price indexes are weighted averages of the growth rates in indexes of prices for electric utility plant and O&M labor and materials and services. The index for each utility uses as weights the share of each input group in the total cost of the company's base rate inputs.[48] The index for the price of plant was calculated from the trends in bond yields, allowed returns on equity, and the Handy Whitman Construction Cost Index for vertically integrated electric utilities in the applicable region.

Results of our input price research are presented in Table 5 and Figure 3. It can be seen that the prices of base rate inputs averaged 2.76% annual inflation in the 1996-2002 period and 3.65% inflation in the 2003-2008 period --- an increase of 89 basis points. The price acceleration was primarily in materials and services and capital. M&S price inflation averaged 2.08% annually in the 1996-2002 period and 4.31% annually in the 2003-2008 period.

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[48] An input price index with cost share weights effectively estimates the impact of price inflation on cost.

Table 5

Trends in Prices of Electric Utility Base Rate Inputs, 1996-2008

	Summary Input Price Index		Labor		Materials & Services		Capital	
Year	Index	Growth Rate	Index	Growth Rate	Index	Growth Rate	Index	Growth Rate
1995	1.000		1.000		1.000		1.000	
1996	1.032	3.2%	1.033	3.2%	1.020	2.0%	1.034	3.3%
1997	1.061	2.7%	1.065	3.1%	1.042	2.1%	1.061	2.7%
1998	1.095	3.2%	1.108	4.0%	1.058	1.6%	1.098	3.4%
1999	1.114	1.7%	1.139	2.7%	1.076	1.6%	1.112	1.2%
2000	1.162	4.2%	1.193	4.6%	1.109	3.0%	1.158	4.1%
2001	1.185	1.9%	1.242	4.0%	1.135	2.4%	1.168	0.8%
2002	1.213	2.3%	1.301	4.6%	1.157	1.9%	1.186	1.5%
2003	1.246	2.7%	1.356	4.2%	1.189	2.7%	1.206	1.7%
2004	1.289	3.4%	1.428	5.1%	1.241	4.3%	1.227	1.7%
2005	1.337	3.7%	1.501	5.0%	1.303	4.9%	1.251	1.9%
2006	1.417	5.8%	1.652	9.6%	1.364	4.6%	1.303	4.1%
2007	1.451	2.3%	1.578	-4.6%	1.421	4.1%	1.352	3.6%
2008	1.510	4.0%	1.629	3.2%	1.498	5.3%	1.396	3.2%
Average Annual Growth Rate								
1996-2008		**3.17%**		**3.76%**		**3.11%**		**2.57%**
1996-2002		**2.76%**		**3.76%**		**2.08%**		**2.43%**
2003-2008		**3.65%**		**3.75%**		**4.31%**		**2.72%**

Sources

Labor: Calculated by PEG Research from BLS Employment Cost Indexes that include pensions and benefits

Materials & Services: Calculated by PEG Research using functional cost shares for sampled utilities obtained from FERC Form 1 and detailed electric utility M&S price indexes obtained from Global Insight's *Power Planner.*

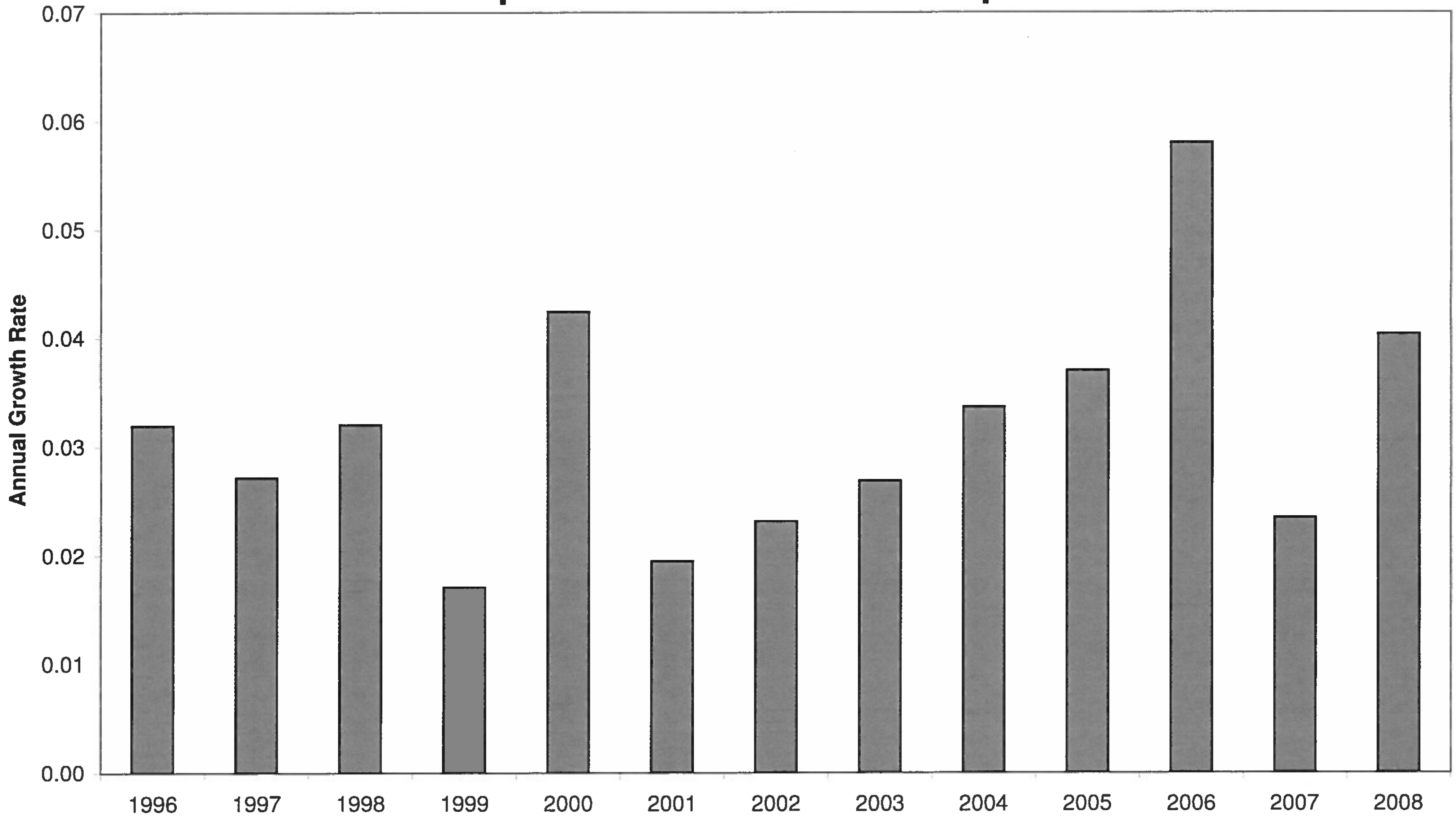
Capital: Calculated by PEG Reseach from
- Handy Whitman electric utility construction cost indexes
- Average yields on utility bonds calculated from FERC Form 1 data gathered by SNL Interactive
- Applicable allowed ROEs as reported by Regulatory Research Associates

Summary: Calculated by PEG Research from the labor, M&S, and capital price indexes using vertically integrated electric utility base rate input cost shares drawn from FERC Form 1

FERC Form 1 data gathered by SNL

Figure 3

Base Rate Input Price Inflation of Sampled Utilities



Plant Additions Large plant additions were noted in Section 1.2.1 to be an important driver of utility productivity growth. Table 6 and Figure 4 describe the trend in real (*i.e.* inflation adjusted) plant additions per customer of the sampled utilities. It can be seen that from 2003 through 2008, real plant additions were 25% higher on average than in the 1995-2002 period.

Average Use In Table 7 and Figure 5 we present information on the trends in weather normalized average use by the residential and commercial customers of a large sample of U.S. electric utilities from 1996 to 2008. The sample included specialized transmission and distribution utilizes as well as VIEUs. It can be seen that the growth rates in average use have tended to fall for both residential and commercial customers since 2002. The trend was more pronounced for residential customers. Growth in normalized average use of power by residential customers averaged 1.09% per year in the 1996-2002 period and 0.43% per year in the 2003-2008 period. Growth in weather-normalized average use by commercial customers averaged 1.04% per year in the 1996-2002 period and 0.74% per year in the 2003-2008 period.

The average use slowdown was especially pronounced in the 2006-2008 period. The normalized average use of residential customers averaged a slight 0.19% annual decline and average use by commercial customers was essentially flat. For this more recent period, we separately calculated trends for utilities in service territories with large DSM programs and the trends for utilities in other territories. The normalized average use by residential customers of utilities operating in territories with large DSM programs declined by a remarkable 0.68% on average.

These results suggest that the typical IOUs may not be able in the future to count on brisk growth in average use by residential and commercial customers to buffer the impact on unit cost growth of input price inflation and increased plant additions. The problem will be considerably more acute in service territories where there are aggressive conservation programs. Forward test years will be particularly uncompensatory where utilities must cope with the consequences for load of aggressive DSM programs.

Table 6

Real Plant Additions Per Customer of Sampled Utilities

	Real Additions to Plant in Service (1995=100)	Number of Customers (1995=100)	Real Additions per Customer (1995=100)
1995	100.00	100.00	100.00
1996	93.26	101.89	91.53
1997	85.99	103.99	82.70
1998	70.50	106.33	66.30
1999	89.82	108.20	83.01
2000	102.31	110.66	92.46
2001	111.46	112.80	98.81
2002	108.46	114.70	94.56
2003	148.32	116.57	127.23
2004	110.42	118.78	92.96
2005	115.52	120.98	95.49
2006	125.04	123.89	100.93
2007	149.51	125.82	118.83
2008	165.19	126.85	130.22
Averages			
1996-2002			87.05
2003-2008			110.94

Sources: Cost and cutomer data from FERC Form 1. Plant additions deflated using applicable regional Handy Whitman electric utility construction cost indexes.

Figure 4

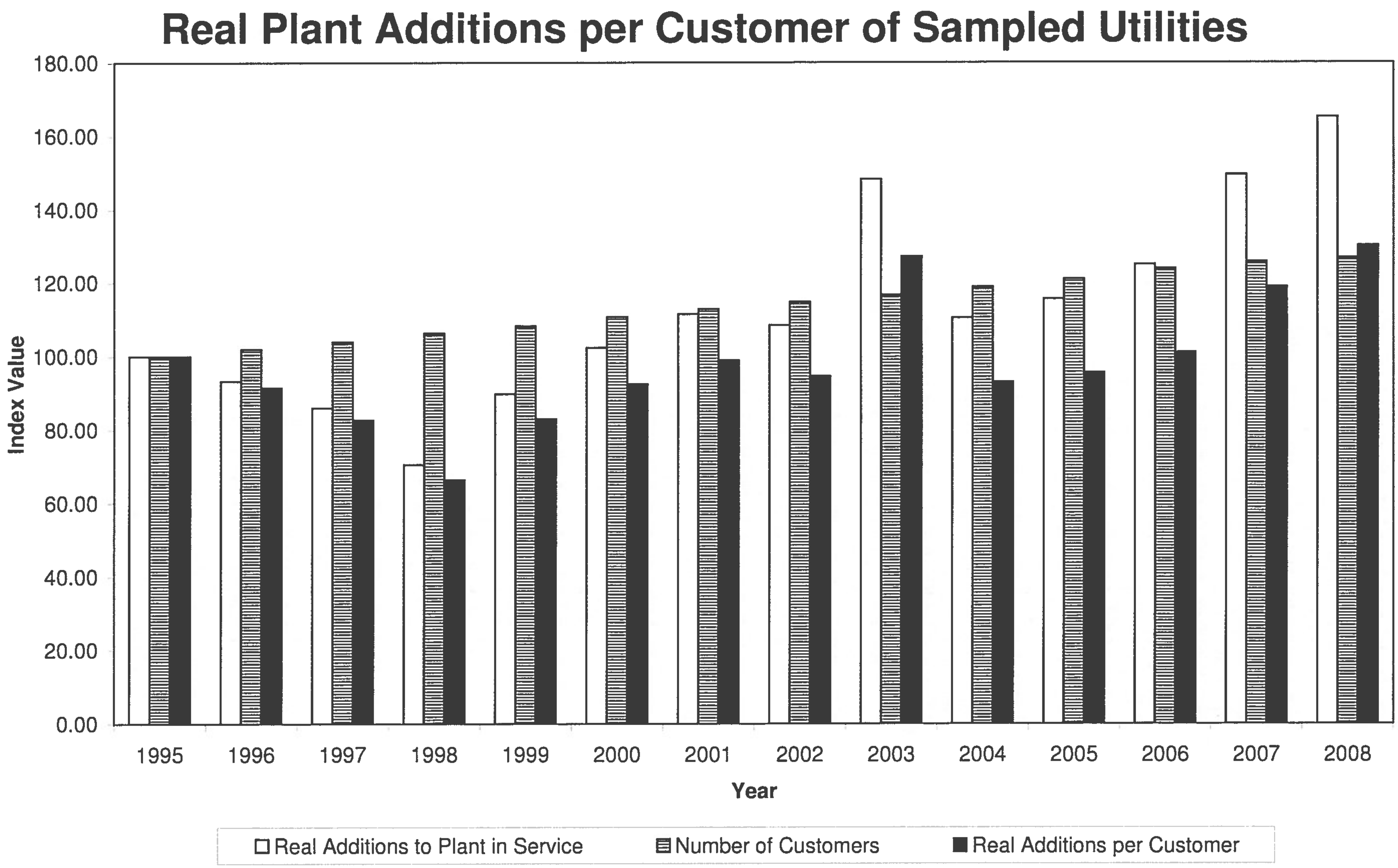

Real Plant Additions per Customer of Sampled Utilities
Index Value
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year
Real Additions to Plant in Service
Number of Customers
Real Additions per Customer

Table 7

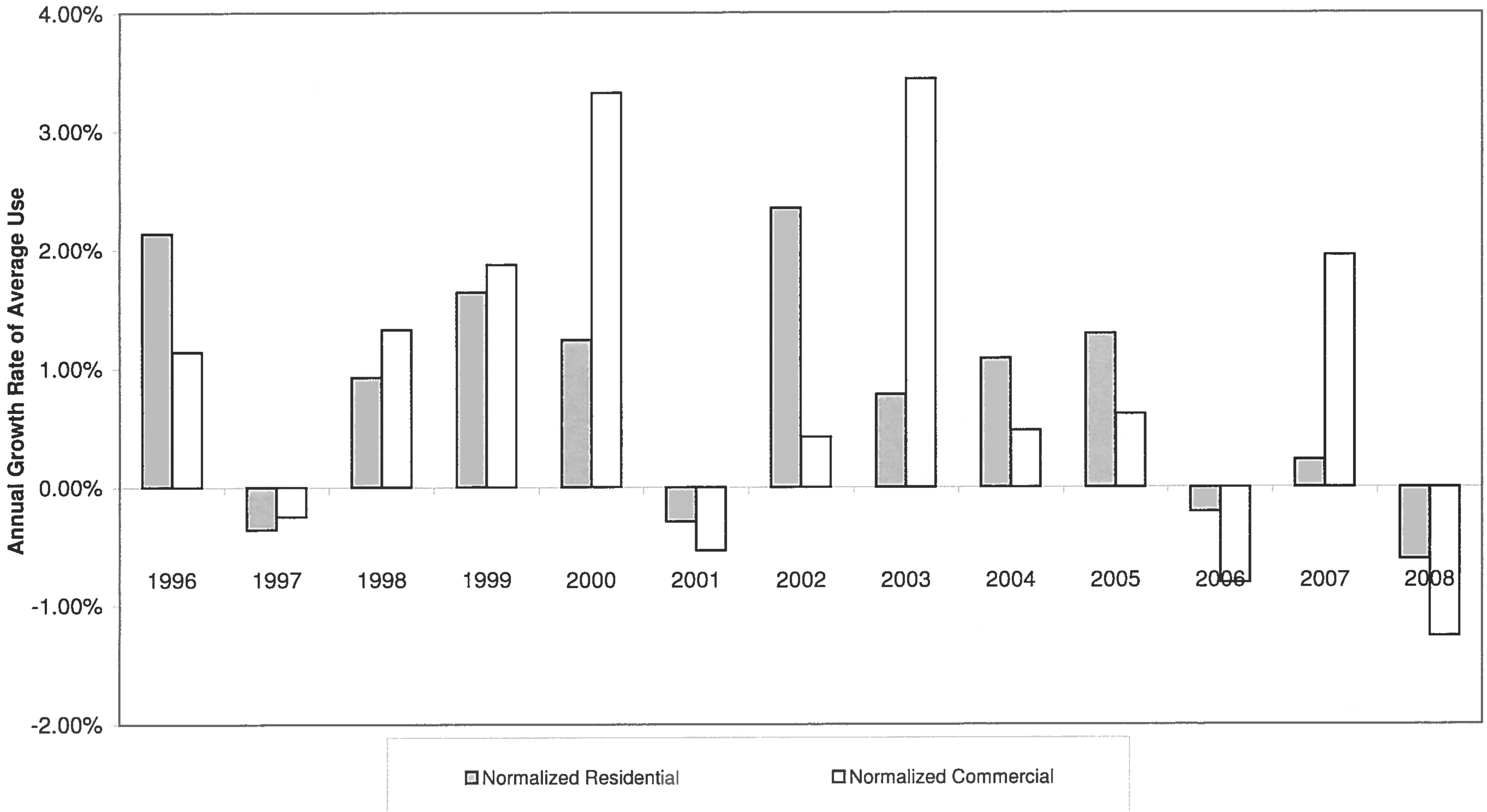
Trends in Average Use by Residential & Commercial Customers of Investor-Owned Electric Utilities

	Residential		Commercial	
Year	Raw	Normalized	Raw	Normalized
1996	1.10%	2.14%	0.68%	1.14%
1997	-2.35%	-0.36%	-0.43%	-0.25%
1998	1.39%	0.93%	1.91%	1.33%
1999	1.66%	1.64%	1.63%	1.87%
2000	2.02%	1.24%	3.20%	3.33%
2001	-0.65%	-0.29%	-0.35%	-0.53%
2002	4.18%	2.35%	0.71%	0.42%
2003	-0.71%	0.78%	2.88%	3.44%
2004	0.03%	1.08%	0.35%	0.48%
2005	4.02%	1.29%	1.24%	0.61%
2006	-2.86%	-0.21%	-1.06%	-0.80%
2007	2.68%	0.23%	2.26%	1.95%
2008	-1.95%	-0.61%	-1.83%	-1.26%
Average Annual Growth Rate				
1996-2008	**0.66%**	**0.79%**	**0.86%**	**0.90%**
1996-2002	**1.05%**	**1.09%**	**1.05%**	**1.04%**
2003-2008	**0.20%**	**0.43%**	**0.64%**	**0.74%**
2006-2008	**-0.71%**	**-0.19%**	**-0.21%**	**-0.04%**
High DSM utilities	**-1.07%**	**-0.68%**	**-0.19%**	**-0.08%**
Other utilities	**-0.54%**	**0.05%**	**-0.22%**	**-0.02%**

Sources: Customer data from FERC Form 1. Volume data from Form EIA 861. Volumes were weather normalized by PEG Research using econometric demand modelling.

Figure 5

Normalized Average Use Trends of Electric IOUs



3.2 How Test Years Affect Credit Quality Metrics

Table 8 presents results for selected credit quality metrics for a large sample of electric utilities. The reported metrics are averages for the 2006-2009 period. The source is *Credit Stats: Electric Utilities—U.S.*, a report appearing in the Global Credit Portal of Standard & Poor's RatingsDirect. We present results for four credit metrics: Standard & Poor's corporate credit rating, the (rate of) return on capital, and two cash flow ratios (EBITDA interest coverage and FFO/Debt).

Cash flow ratios are used by credit analysts to assess a utility's ability to service debt. The cash flow measures are normally calculated as adjustments to net income that add back cash flows that could be used to service debt. FFO (funds from operations), for instance, adds back depreciation and amortization expenses. EBITDA (earnings before interest, taxes, depreciation, and amortization) adds back interest and tax payments as well as depreciation and amortization.

Table 8 reports averages for each of the numerical metrics for utilities that operated under historical, hybrid, and forward test years throughout the 2006-2008 period. There is also an indeterminate category for utilities that are not easily categorized as having operated under one kind of test year during this period.

Caution must be taken in making comparisons inasmuch as these metrics may differ between the sampled utilities due to differences in several other business conditions as well as to any differences in test years. The other relevant business conditions include the ability to rate base construction work in progress, the local severity of the 2008 recession, and whether or not utilities operated under formula rates and/or revenue decoupling. Despite these complications, the samples are large and diverse enough to shed some light on the effect that test years have on credit metrics.

Comparing the results, it can be seen that the values of all four credit metrics were typically much more favorable for the *forward* test year utilities than for the *historical* test year utilities.

- The forward test year utilities had a typical credit rating between BBB+ and A- whereas the historical test year utilities had a typical credit rating between BBB- and BBB.

Table 8

How Credit Metrics of Electric Utilities Differ by Test Year, 2006-2008

Company Name	S&P Corporate Credit Rating	Return on Capital (%)	EBITDA/Interest Coverage	FFO/debt (%)
Historical Test Years		**7.9**	**4.2**	**18.2**
AEP Texas Central	BBB	6.9	2.8	8.7
AEP Texas North	BBB	8.1	4.9	21.0
Appalachian Power	BBB	6.0	2.9	9.5
Arizona Public Service	BBB-	7.3	4.6	19.3
Black Hills Power	BBB-	9.6	4.8	25.3
Carolina Power & Light	BBB+	11.3	5.9	25.0
CenterPoint Energy Houston Electric	BBB	9.8	6.2	24.4
Central Illinois Light	BBB-	9.5	8.2	29.5
Central Illinois Public Service	BBB-	4.9	3.6	15.7
Central Vermont Public Service	BB+	7.0	2.7	12.8
Commonwealth Edison	BBB-	6.4	3.1	12.1
Duke Energy Carolinas	A-	7.0	6.1	28.5
Duke Energy Indiana	A-	8.0	5.1	21.3
El Paso Electric	BBB	9.4	4.2	18.8
Entergy Gulf States	BBB	7.2	2.8	25.1
Entergy Louisiana	BBB	6.6	3.2	36.3
Entergy Texas	BBB	5.6	2.5	14.0
Interstate Power & Light	BBB+	10.5	5.5	24.4
IPALCO Enterprises (Indianapolis Power & Light)	BB+	13.2	3.4	12.9
Kentucky Power	BBB	6.5	3.5	13.8
MidAmerican Energy	A-	10.7	5.5	22.7
Nevada Power	BB	8.4	2.6	11.1
NSTAR Electric	A+	10.2	7.7	21.6
Oklahoma Gas & Electric	BBB+	10.0	6.4	25.2
Oncor Electric Delivery	BBB+	9.6	4.4	17.9
Public Service Company of Colorado	BBB+	8.1	4.3	19.6
Public Service Company of New Hampshire	BBB	8.4	4.8	13.7
Public Service Company of New Mexico	BB-	3.9	2.3	8.6
Public Service Company of Oklahoma	BBB	4.9	2.7	18.3
Puget Sound Energy	BBB	7.5	3.8	13.7
Sierra Pacific Power	BB	7.4	2.9	12.7
South Carolina Electric & Gas	BBB+	8.3	4.7	21.1
Southern Indiana Gas & Electric	A-	9.5	5.4	22.8
Southwestern Electric Power	BBB	7.4	3.5	15.4
Southwestern Public Service	BBB+	5.3	3.5	12.1
Texas-New Mexico Power	BB-	5.3	3.3	9.5
Tuscon Electric Power	BB+	8.4	3.2	17.9
Westar Energy	BBB-	6.7	3.9	14.8
Western Massachusetts Electric	BBB	5.8	3.7	11.8
Hybrid Test Years		**9.5**	**5.9**	**19.9**
Atlantic City Electric	BBB	9.6	4.4	34.2
Baltimore Gas & Electric	BBB	6.8	4.3	11.1
Cleveland Electric Illuminating	BBB	13.3	4.3	9.2
Cleco Power	BBB	8.3	3.7	10.9
Columbus Southern Power	BBB	13.5	6.5	23.3
Dayton Power & Light	A-	16.3	16.1	42.9
Duke Energy Ohio	A-	5.2	6.3	25.5
Entergy Arkansas	BBB	6.7	5.6	27.7
Idaho Power	BBB	6.6	3.8	10.7
Jersey Central Power & Light	BBB	8.3	8.5	22.9
Metropolitan Edison	BBB	9.3	6.7	12.7
Ohio Edison	BBB	9.4	4.6	14.5
Ohio Power	BBB	8.2	4.3	15.0
PECO Energy	BBB	10.5	7.0	19.5
Pennsylvania Electric	BBB	8.9	5.5	15.8
PPL Electric Utilities	A-	9.5	4.6	18.6
Public Service Electric & Gas	BBB	8.7	4.9	14.9
Toledo Edison	BBB	11.9	5.2	28.0

Table 8, continued

How Credit Metrics of Electric Utilities Differ by Test Year, 2006-2008

Company Name	S&P Corporate Credit Rating	Return on Capital (%)	EBITDA/Interest Coverage	FFO/debt (%)
Forward Test Years		**9.2**	**5.1**	**21.0**
ALLETE (Minnesota Power)	BBB+	10.8	5.1	19.5
Central Hudson Gas & Electric	A	9.6	4.9	14.9
Central Maine Power	BBB+	8.2	5.3	17.8
Connecticut Light & Power	BBB	6.7	4.3	12.2
Detroit Edison	BBB	8.2	4.9	16.8
Entergy Mississippi	BBB	7.2	4.3	27.1
Florida Power & Light	A	9.9	7.0	30.7
Florida Power Corp.	BBB+	9.9	4.5	19.0
Georgia Power	A	10.1	5.9	22.6
Gulf Power	A	9.7	5.6	19.2
Hawaiian Electric	BBB	7.1	4.4	15.3
Mississippi Power	A	11.6	8.9	35.5
Northern States Power - MN	BBB+	9.4	4.9	22.9
Northern States Power - WI	A-	8.8	5.9	26.6
Pacific Gas & Electric	BBB+	10.7	4.0	23.3
PacifiCorp	A-	7.9	4.0	17.3
Portland General Electric	BBB+	7.9	4.1	19.2
Rochester Gas & Electric	BBB	9.4	3.8	19.4
Southern California Edison	BBB+	11.4	4.0	19.3
Tampa Electric	BBB	9.6	4.5	21.0
Wisconsin Electric Power	A-	6.9	5.4	14.6
Wisconsin Power & Light	A-	10.1	5.0	24.7
Wisconsin Public Service	A-	9.8	5.6	23.8
Indeterminate		**7.8**	**4.3**	**18.1**
Alabama Power	A	9.5	5.7	21.5
Empire District Electric	BBB-	7.3	3.5	15.7
Indiana Michigan Power	BBB	6.7	3.5	15.4
Kansas City Power & Light	BBB	7.9	4.8	19.4
Potomac Electric	BBB	7.4	4.4	20.6
Southwestern Electric Power	BBB	7.4	3.5	15.4
Union Electric	BBB-	8.2	4.4	18.4
All Companies		**8.6**	**4.8**	**19.3**

Source: Standard & Poor's Ratings Direct, *Credit Stats: Electric Utilities - U.S.* August 24, 2009. Financial metrics are averages of the years 2006-2008.

- The forward test year utilities had an average return on capital of 9.2% whereas the historical test year utilities had an average return of 7.9%.
- The forward test year utilities had an average EBITDA/interest coverage of 5.1 whereas the historical test year utilities had an average coverage of 4.2
- The forward test year utilities had an average FFO/debt ratio of 21.0% whereas the historical test year utilities had an average ratio of 18.2%.

Additional insights concerning the effect of forward test years on credit quality can be found in another recent Standard & Poor's report.[49] The study sought to rank state regulatory regimes with respect to their effect on credit quality. Of the fourteen states covered by the study which had well-established forward test year traditions at the time of the study, the author found five to be "more credit supportive", six to be "credit supportive", only two to be "less credit supportive", and none to be "least credit supportive". In contrast, of the seventeen states covered by the study that had well-established historical test year conditions, only three were categorized as "more credit supportive", seven were categorized as "credit supportive", six were categorized as "less credit supportive" and one was categorized as "least credit supportive".

3.3 Incentive Impact of Forward Test Years

In Section 1.2.4 we noted that the incentive impact of forward test years has been an issue in some proceedings. We argued, based on our experience in the field of incentive regulation, that the incentive impact of forward and historical test years should be similar on balance. To test the hypothesis that the choice of a test year has no impact on operating efficiency, PEG Research measured the trends in the O&M expenses of a large group of VIEUs over the 1996-2008 sample period. O&M expenses are a better focus than the total cost of base rate inputs in such a study because some utilities had greater needs than others for major plant additions and these needs had little to do with the kind of test year in a jurisdiction. Differences in cost growth are due in part to differences in output growth, so we divided O&M expenses by three alternative output metrics: generation volumes, generation capacity, and the number of customers served. We calculated how the trends in the three cost metrics differed for utilities operating under three kinds of test years: historical, hybrid, and

[49] Todd Shipman, *Assessing U.S. Utility Regulatory Environments*, Standard & Poor's Ratings Direct, November 2008.

forward. If forward test years weaken operating efficiency, we would expect the growth in the cost metrics to be higher on average for the forward test year utilities.

Results of this exercise are reported in Table 9. It can be seen that, using all three cost metrics, the cost trends of the forward test year utilities were similar to --- and a little slower than --- those of the historical test year utilities and of the full utility sample. These results are consistent with the notion that there is no significant difference in the incentives to contain cost that are generated by future and historical test years.

Table 9

Trends in Unit Non-Fuel O&M Expenses by Test Year, 1996-2008

	Test Year Type			
	Historic	Partial	Forward	All
Cost/Customer	2.1%	2.0%	1.9%	2.2%
Cost/Generation Volume	2.2%	3.0%	1.4%	2.3%
Cost/Generation Capacity	1.9%	3.2%	1.3%	1.9%

Source: Federal Energy Regulatory Commission (FERC) Form 1 and Form EIA-876 data gathered by SNL Financial.

4. CONCLUDING REMARKS

Having established in some detail in the chapters above the financial stresses imposed on U.S. electric utilities by historical test years today, we provide in this chapter some concluding remarks on action plans for regulators who wish to move forward with sensible remedies.

4.1 Sensible First Steps

In states where regulators are interested in experimenting with forward test years but not yet prepared to "make the plunge" to large scale adoption, our discussion has identified a number of cautious first steps down the road that limit the risk of bad outcomes but permit the regulatory community to learn more about FTY pros and cons.

- Allow a forward test year on a trial basis for one interested utility.
- Allow forward test years on an occasional basis when a utility makes a convincing case that rising unit costs make historical test years unjust and unreasonable. A ruling on the test year issue can precede the preparation of a rate case, as in Utah.
- Borrow a few of the methods used in FTY rate cases to make additional adjustments to *historical* test year costs and billing determinants. For example, HTY O&M expenses and/or plant addition costs can be adjusted for forecasts of price inflation prepared by respected independent agencies. Residential and commercial delivery volumes can be adjusted for recent average use trends. Special adjustments can be made for looming major plant additions.
- Try current FTYs, which involve forecasts only one year into the future. Current test years can be combined with interim rate increases at the outset a rate case which are subject to true up when new rates are ultimately approved. The combination of current test years and interim rates is a salient option because it eliminates regulatory lag without a two year forecast.

4.2 Alternative Remedies for Test Year Attrition

In states where regulators aren't ready to abandon historical test years but are sympathetic to the attrition problems that they sometimes cause, a variety of alternative measures are available to relieve the financial attrition that can result from using historical test years in a rising unit cost environment.

1. HTY calculations can incorporate the full array of normalization, annualization, and known and measurable change adjustments that are used in other jurisdictions.
2. Utilities can be permitted to implement interim rate increases. Interim rates can effectively reduce regulatory lag by a year. States that permit interim rates include HI, IA, MI, MO, NH, OK, TX, VA, and WI.
3. Capital spending trackers can ensure timely commencement of the recovery of costs of plant additions, without rate cases, when assets become used and useful. Trackers can be designed to maintain incentives for good capital cost management and timely project completion. Monitoring by PEG Research reveals that capital spending trackers have been approved for use by energy utilities in AR, CA, FL, GA, IA, ID, IL, IN, KS, KY, MD, ME, MN, MO, NJ, NY, OH, OK, OR, PA, TX, VA, and WI.
4. The inclusion of CWIP in rate base improves cash flow and reduces future rate shocks. This practice also reduces the losses that a utility experiences making large plant additions under historical test year rates. Monitoring by the Edison Electric Institute has found that states that have recently allowed inclusion of CWIP in rate base include CO, FL, GA, IN, KS, KY, LA, MI, MO, NC, NM, NV, SD, TN, VA, and WV.
5. Cost trackers can also adjust rates automatically to ensure timely recovery of O&M expenses that are unusually volatile and/or expected to rise rapidly. Expenses that are often recovered using trackers include those for pensions and benefits, uncollectible bills, and DSM.
6. Several methods have been established to compensate utilities for slowing growth in average use.
    - Lost revenue adjustment mechanisms (a/k/a lost margin trackers) restore margins that are estimated to have been lost because of utility conservation programs. These are currently used by electric utilities in CT, IN, KY, OH, NC, and SC.

- Decoupling true-up plans help base rate revenue track revenue requirements more closely and can thereby restore lost margins that result from slow growth in average use resulting from a wider variety of sources, including conservation programs administered by independent agencies. Such plans are currently used by electric utilities in CA, CT, DC, HI, ID, MA, MD, MI, NY, OR, VT, and WI. They are used by gas utilities in several additional states (*e.g.* AR, CO, IN, MN, NJ, NC, UT, VA, WA, and WY).
- Higher customer charges are also effective in reducing attrition from declining average use. Straight fixed variable pricing, which recovers *all* fixed costs using fixed charges, is used by gas utilities in GA, MO, OH, OK, and ND.

7. The duration of rate cases can be limited. A reasonable cap is the average length of cases in the United States, which is currently between nine and ten months.[50]
8. Multiyear rate plans can give utilities rate escalation between rate cases for inflation and other business conditions that drive cost growth. Such plans typically have a duration of three to five years, and terms of seven to ten years have been approved. Even if an historical test year makes the initial rates under such plans non-compensatory, it would only happen once in a multiyear period. Utilities would have several years to recoup their losses through superior productivity growth --- and an incentive to do so. North American jurisdictions where multiyear rate plans are common include CA, ME, MA, NY, OH, and VT in the United States and Alberta, British Columbia, and Ontario in Canada. This approach to ratemaking is more the rule than the exception overseas.

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[50] See *EEI 2007 Financial Review*, p. 36.

APPENDIX: UNIT COST LOGIC

To better understand the conditions that can cause historical test year rates to produce earnings attrition, suppose that year t is a rate year (a year when new rates take effect) and that the utility is underearning with its newly implemented HTY rates. The cost of base rate inputs then exceeds base rate revenue and the ratio of cost to revenue is positive.

$$Cost_t / Revenue_t > 0.$$

To simplify the story, suppose next that the utility has only one service and the base rate for that service is gathered exclusively from a volumetric charge. In the historical test year, the revenue requirement is then the product of a price (P_{t-2}) and a volume (V_{t-2}) and this is set equal to the allowed cost of service

$$P_{t-2} \times V_{t-2} = Cost_{t-2}$$

so that

$$P_{t-2} = Cost_{t-2} / V_{t-2} = Unit\ Cost_{t-2}.$$

The rate equals the cost per kWh of sales, which we may call the *unit* cost of service in the historical test year.

Revenue in the rate year is the product of this same price, which reflects *historical* business conditions, and the *contemporary* sales volume. The ratio of cost to revenue may then be restated as

$$\begin{aligned} Cost_t / Revenue_t &= Cost_t / (P_{t-2} \times V_t) \\ &= Cost_t / [(Cost_{t-2} / V_{t-2}) \times V_t] \\ &= (Cost_t / V_t) / (Cost_{t-2} / V_{t-2}) \\ &= Unit\ Cost_t / Unit\ Cost_{t-2}. \qquad [A1] \end{aligned}$$

An historical test year rate is thus non-compensatory if the utility's unit cost is higher in the rate year than it was two years ago in the test year. Growth in the unit cost of the utility is thus the fundamental reason for earnings attrition. Note also that

$$Unit\ Cost_t / Unit\ Cost_{t-2} = (Cost_t / Cost_{t-2}) / (V_t/V_{t-2}). \qquad [A2]$$

Unit cost thus grows between the test year and the rate year if cost grows more rapidly than the sales volume. Growth in the sales volume therefore matters as well as cost growth in determining a utility's unit cost trend. Moreover, the ability of historical test year rates to avoid under or, for that matter, over earning depends on the stability of the relationship between cost and billing determinants.

The key result that historical test years are non-compensatory when unit cost is rising extends to the real world situation in which a utility provides multiple services, each with several charges. In this situation the ratio of the total delivery volume in [A2] is replaced by a weighted average of the ratios for all billing determinants.[51]

[51] The weight for each individual billing determinant is its share of the total base rate revenue.

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MOODY'S
INVESTORS SERVICE

Credit Opinion: Kentucky Utilities Co.

Global Credit Research - 08 Dec 2013

Lexington, Kentucky, United States

Ratings

Category	Moody's Rating
Outlook	Rating(s) Under Review
Issuer Rating	*Baa1
First Mortgage Bonds	*A2
Senior Secured Shelf	*(P)A2
Sr Unsec Bank Credit Facility	*Baa1
Commercial Paper	P-2
Ult Parent: PPL Corporation	
Outlook	Rating(s) Under Review
Issuer Rating	*Baa3
Pref. Shelf	*(P)Ba2
Parent: LG&E and KU Energy LLC	
Outlook	Rating(s) Under Review
Issuer Rating	*Baa2
Senior Unsecured	*Baa2

* Placed under review for possible upgrade on November 8, 2013

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Opinion

Rating Drivers

- Supportive regulatory environment

- Large capital expenditure program

- High coal concentration

- Strong and stable financial metrics

Corporate Profile

Kentucky Utilities (KU: Baa1 Issuer Rating) is a regulated public utility engaged in the generation, transmission and distribution of electricity. KU provides electric service to approximately 510,000 customers in Kentucky and 29,000 customers in Virginia. Its service territory covers approximately 4,800 square miles.

KU is a wholly-owned subsidiary of LG&E and KU Energy LLC (LKE: Baa2 Issuer Rating). KU and its affiliate, Louisville Gas and Electric Company (LG&E: Baa1 Issuer Rating), are the two main operating entities of LKE. LKE in turn is wholly owned by PPL Corporation (PPL: Baa3 Issuer Rating), a diversified energy holding company headquartered in Allentown, PA.

SUMMARY RATING RATIONALE

KU's Baa1 Issuer Rating reflects its sound financial performance and the credit supportive regulatory environment in which it operates, offset in part by a large capital expenditure program and, to a lesser extent, a lack of fuel and geographic diversity.

DETAILED RATING CONSIDERATIONS

SUPPORTIVE REGULATION PROVIDES FOR TIMELY COST RECOVERY

We consider the Kentucky Public Service Commission (KPSC) to be supportive of long term credit quality and note that it has approved various tracker mechanisms that provide for timely cost recovery outside of a rate case. KU's tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR) and a Demand-Side Management Cost Recovery Mechanism (DSM). KU does not have a decoupling mechanism in place, which subjects KU's net revenue to weather volatilities. The lack of a decoupling mechanism is less of an issue for non-weather related demand fluctuations because KU has the DSM and expects to have modest load growth in 2014.

In December 2012, the KPSC approved KU's settlement regarding the rate case filed in June 2012 which requested a base rate increase of $82 million for electricity (6.5%), to take effect in January, 2013. The settlement granted KU an increase in electric base rates of $51 million with an authorized ROE of 10.25%. The rate case progressed without being unusually controversial or contentious; we consider the decision a constructive result. Due to the high level of planned capital expenditures, KU is likely to file for another rate case in 2014.

LARGE PLANNED CAPITAL EXPENDITURES

Capital expenditures for KU are expected to remain at elevated levels from 2013-2017. Total capital expenditures are expected to be $3.1 billion, with $1.2 billion related to environmental. The total estimated amount represents about 56% of its net book value of property, plant and equipment, which stands at about $5.5 billion at the end of the third quarter 2013.

The disallowance risk associated with large capital expenditures is meaningfully moderated by Kentucky's supportive regulatory environment as detailed above. KPSC is also authorized to grant return on construction work in progress (CWIP) in rate case proceedings. Moreover, the ECR virtually eliminates regulatory lag for investments associated with complying with the Clean Air Act and coal combustion waste and byproduct environmental requirements. The terms of the ECR allows KU to receive the return of and a return on the investment starting two months after making the investment. This is highly favorable compared to the traditional process where regulatory lag could last a few years due to the length of the construction period plus the rate case proceeding.

HIGH COAL CONCENTRATION

KU's current fuel mix is heavily biased towards coal. Of its 4.8 GW of generating capacity, 3.4 GW (69%) is coal-fired and it provides almost all (95%) of generation. The remaining 31% of the generating capacity is comprised mainly of gas- or oil- fired facilities that are utilized as peakers.

The fuel concentration, though a credit negative, is acceptable for its rating levels because Kentucky is very supportive of the coal industry. Kentucky is one of the leading coal producing states and the coal industry is very important to the local economy. The support is evidenced by the passage of the ECR, which provides the company with highly favorable terms for its investments in coal-related environmental expenditures.

KU's fuel mix may also improve in the future as KU, along with LG&E, is building a 640-MW gas-fired combined cycle plant at Cane Run and plans to build a 700-MW gas-fired combined-cycle plant at KU's Green River generating site. The Cane Run gas plant is under construction and due to be completed by the end of 2015. Cane Run will replace some of the less economic coal plants totaling 234 MW at Tyrone and Green River that are being closed. The construction of the Green River gas plant has been announced but not yet approved. If approved, it is expected to be in service by end of 2018 to accommodate expected load growth.

The operating status of E.W. Brown unit 1 & 2, which accounts for 172 MW of coal generation capacity, was in question due to environmental compliance concerns. However, the company now believes that it can continue to operate the plant for a few more years without a major environmental retrofit.

HEALTHY FINANCIAL PROFILE

KU's financial metrics have been strong for its rating. As of September 30, 2013, the ratio of consolidated cash flow before changes in working capital (CFO pre W/C) to debt was 26% for the last twelve months and averaged 24% for the past three years. Debt to capitalization was 36% for the last twelve months and averaged 37% for the past three years. KU's financial metrics may decline somewhat over the next few years due to the expiration of bonus depreciation after 2013 and the large capital expenditure program. However, we expect KU's financial metrics to remain supportive of its rating levels based on the company's targeted capital structure of 52% equity, which is calculated net of goodwill and fully loaded with rating agency adjustments. KU's goodwill amounted to $607 million at the end of September 2013 and in comparison the total equity, including the goodwill, was $2,963 million.

Liquidity Profile

KU has adequate liquidity. As of September 30, 2013, after accounting for all commercial paper backup and letter of credits issued, KU has $260 million available under its $400 million revolving facility. For the past twelve months ending September 2013, KU had a negative free cash flow of $267 million which is likely to be sizeable in the coming years given its large capital expenditure program. KU's next long-term debt maturity is a $250 million first mortgage bond issuance due November 2015.

LKE manages the liquidity of its Kentucky utility operations on a consolidated basis. KU has a $400 million stand-alone revolving credit facility and LG&E, it sister affiliate, has a $500 million stand-alone credit facility. Both facilities expire in November 2017. In October 2013, LKE, KU's parent company, entered into a $75 million syndicated credit facility that expires in October 2018. Each facility contains a financial covenant requiring the companies' debt to total capitalization not to exceed 70%. All entities were in compliance as of September 30, 2013.

Rating Outlook

The review for upgrade reflects our improved view of US utility regulatory relations and credit-supportiveness generally, as exemplified in Kentucky with regulatory outcomes including a strong suite of recovery mechanisms. The continued above-average performance in KU's financial metrics over the near-term driven in part by the credit supportive environment is also a consideration.

What Could Change the Rating - Up

KU could be upgraded by one notch following the review process currently underway.

What Could Change the Rating - Down

KU's ratings could be downgraded should the company experience an unfavorable rate case outcome or if unanticipated changes were made to the regulatory compact that currently provides for timely recovery of costs and this were to lead to the company's ratios of CFO pre-WC to debt and retained cash flow to debt dropping below 20% and 15%, respectively, for an extended period of time.

Rating Factors

Kentucky Utilities Co.

Regulated Electric and Gas Utilities Industry [1][2]	**LTM 09/30/2013**			**Moody's 12-18 month Forward View* As of November 2013**	
Factor 1: Regulatory Framework (25%)	Measure	Score		Measure	Score

a) Regulatory Framework		Baa		Baa
Factor 2: Ability To Recover Costs And Earn Returns (25%)				
a) Ability To Recover Costs And Earn Returns		A		A
Factor 3: Diversification (10%)				
a) Market Position (5%)		Baa		Baa
b) Generation and Fuel Diversity (5%)		B		B
Factor 4: Financial Strength, Liquidity And Key Financial Metrics (40%)				
a) Liquidity (10%)		Baa		Baa
b) CFO pre-WC + Interest/ Interest (3 Year Avg) (7.5%)	7.6x	Aa	7.5-7.8x	Aa
c) CFO pre-WC / Debt (3 Year Avg) (7.5%)	24.4%	A	22-25%	A
d) CFO pre-WC - Dividends / Debt (3 Year Avg) (7.5%)	19.3%	A	17-20%	A
e) Debt/Capitalization (3 Year Avg) (7.5%)	36.9%	A	36-38%	A
Rating:				
a) Indicated Rating from Grid		A3		A3
b) Actual Rating Assigned		Baa1		A3

* THIS REPRESENTS MOODY'S FORWARD VIEW; NOT THE VIEW OF THE ISSUER; AND UNLESS NOTED IN THE TEXT DOES NOT INCORPORATE SIGNIFICANT ACQUISITIONS OR DIVESTITURES

[1] All ratios are calculated using Moody's Standard Adjustments. [2] As of 09/30/2013(LTM); Source: Moody's Financial Metrics

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MOODY'S
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Credit Opinion: Louisville Gas & Electric Company

Global Credit Research - 08 Dec 2013

Louisville, Kentucky, United States

Ratings

Category	Moody's Rating
Outlook	Rating(s) Under Review
Issuer Rating	*Baa1
First Mortgage Bonds	*A2
Senior Secured Shelf	*(P)A2
Sr Unsec Bank Credit Facility	*Baa1
Commercial Paper	P-2
Ult Parent: PPL Corporation	
Outlook	Rating(s) Under Review
Issuer Rating	*Baa3
Pref. Shelf	*(P)Ba2
Parent: LG&E and KU Energy LLC	
Outlook	Rating(s) Under Review
Issuer Rating	*Baa2
Senior Unsecured	*Baa2

* Placed under review for possible upgrade on November 8, 2013

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Opinion

Rating Drivers

- Supportive regulatory environment

- Large capital expenditure program

- High coal concentration

- Strong and stable financial metrics

Corporate Profile

Louisville Gas and Electric Company (LG&E: Baa1 Issuer Rating) is a regulated public utility engaged in the generation, transmission and distribution of electricity and the storage, distribution and sale of natural gas. It provides electricity to approximately 393,000 customers in Louisville and adjacent areas and delivers natural gas service to approximately 318,000 customers in its electric service area and eight additional counties in Kentucky. LG&E's service area covers approximately 700 square miles.

LG&E is a wholly-owned subsidiary of LG&E and KU Energy LLC (LKE: Baa2 Issuer Rating). LG&E and its affiliate, Kentucky Utilities (KU: Baa1 Issuer Rating), are the two main operating entities of LKE. LKE in turn is wholly owned by PPL Corporation (PPL: Baa3 Issuer Rating), a diversified energy holding company headquartered in Allentown, PA.

SUMMARY RATING RATIONALE

LG&E's Baa1 Issuer Rating reflects its sound financial performance and the credit supportive regulatory environment in which it operates, offset in part by a large capital expenditure program and, to a lesser extent, a lack of fuel and geographic diversity.

DETAILED RATING CONSIDERATIONS

SUPPORTIVE REGULATION PROVIDES FOR TIMELY COST RECOVERY

We consider the Kentucky Public Service Commission (KPSC) to be supportive of long term credit quality and note that it has approved various tracker mechanisms that provide for timely cost recovery outside of a rate case. LG&E's tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR), a Gas Supply Clause (GSC), a Gas Line Tracker (GLT) and a Demand-Side Management Cost Recovery Mechanism (DSM). LG&E does not have a decoupling mechanism in place, which subjects LG&E's net revenue to weather volatilities. The lack of a decoupling mechanism is less of an issue for non-weather related demand fluctuations because LG&E has the DSM and expects to have modest load growth in 2014.

In December 2012, the KPSC approved LG&E's settlement regarding the rate cases filed in June 2012 which requested base rate increase of $62.1 million for electricity (6.9%) and $17.2 million (7%) for gas, to take effect in January, 2013. The settlement granted LG&E an increase in electric base rates of $34 million and an increase in gas base rates of $15 million, with an authorized ROE of 10.25%. In addition, LG&E was granted a gas line tracker mechanism that allows for recovery of costs associated with gas main replacement and other infrastructure improvements. These rate cases progressed without being unusually controversial or contentious. We consider the regulatory treatment of the of this last rate cases to be constructive.

LARGE PLANNED CAPITAL EXPENDITURES

Capital expenditures for LG&E are expected to remain at elevated levels from 2013-2017. Total capital expenditures are expected to be $3 billion, with $1.1 billion related to environmental. The total estimated amount represents about 85% of its net book value of property, plant and equipment, which stood at about $3.5 billion at the end of the third quarter 2013.

The disallowance risk associated with large capital expenditures is meaningfully moderated by Kentucky's supportive regulatory environment as detailed above. KPSC is also authorized to grant return on construction work in progress (CWIP) in rate case proceedings. Moreover, the ECR virtually eliminates regulatory lag for investments associated with complying with the Clean Air Act and coal combustion waste and byproduct environmental requirements. The terms of the ECR allows LG&E to receive the return of and a return on the investment starting two months after making the investment. This is highly favorable compared to the traditional process where regulatory lag could last a few years due to the length of the construction period plus the rate case proceeding.

HIGH COAL CONCENTRATION

LG&E's current fuel mix is heavily biased towards coal. Of its 3.4 GW of generating capacity, 2.7 GW (79%) is coal-fired and it provides almost all (96%) of generation. The remaining 21% of the generating capacity is comprised mainly of gas- or oil- fired facilities that are utilized as peakers. The fuel concentration, though a credit negative, is acceptable for its rating levels because Kentucky is very supportive of the coal industry. Kentucky is one of the leading coal producing states and the coal industry is very important to the local economy. The support is evidenced by the passage of the ECR, which provides the company with highly favorable terms for its investments in coal-related environmental expenditures.

LG&E's fuel mix may also improve in the future as LG&E, along with KU, is building a 640-MW gas-fired combined cycle plant at Cane Run and plans to build a 700-MW gas-fired combined-cycle plant at KU's Green River generating site. The Cane Run gas plant is under construction and due to be completed by the end of 2015. The plants will replace some of the less economic coal plants totaling 800 MW that LG&E and its sister company KU previously announced were being closed and to provide for expected load growth. The construction of the Green River gas plant has been announced but not yet approved. If approved, it is expected to be in service by end of 2018.

HEALTHY FINANCIAL PROFILE

LG&E's financial metrics have been strong for its rating. As of September 30, 2013, the ratio of consolidated cash flow before changes in working capital (CFO pre W/C) to debt was 32.3% for the last twelve months and averaged 28.8% for the past three years. Debt to capitalization was 34% for the last twelve months and averaged 35% for the past three years. LG&E's financial metrics may decline somewhat over the next few years due to the expiration of bonus depreciation after 2013 and the large capital expenditure program. However, we expect LG&E's financial metrics to remain supportive of its rating levels based on the company's targeted capital structure of 52% equity, which is calculated net of goodwill and fully loaded with rating agency adjustments. LG&E's goodwill amounted to $389 million at the end of September 2013 and in comparison the total equity, including the goodwill, was $1,919 million.

Liquidity Profile

LG&E has adequate liquidity. As of September 30, 2013, after accounting for all commercial paper backup and letter of credits issued, LG&E has $428 million available under its $500 million revolving facility. For the past twelve months ending September 2013, LG&E had a negative free cash flow of $171 million which is likely to be sizeable in the coming years given its large capital expenditure program. LG&E's next long-term debt maturity is a $250 million first mortgage bond issuance due November 2015.

LKE manages the liquidity of its Kentucky utility operations on a consolidated basis. LG&E has a $500 million stand-alone revolving credit facility and KU, its sister affiliate, has a $400 million stand-alone credit facility. Both facilities expire in November 2017. In October 2013, LKE, LG&E's parent company, entered into a $75 million syndicated credit facility that expires in October 2018. Each facility contains a financial covenant requiring the companies' debt to total capitalization not to exceed 70%. All entities were in compliance as of September 30, 2013.

Rating Outlook

The review for upgrade reflects our improved view of US utility regulatory relations and credit-supportiveness generally, as exemplified in Kentucky with regulatory outcomes including a strong suite of recovery mechanisms. The continued above-average performance in LG&E's financial metrics over the near-term driven in part by the credit supportive environment is also a consideration.

What Could Change the Rating - Up

LG&E could be upgraded by one notch following the review process currently underway.

What Could Change the Rating - Down

LG&E's ratings could be downgraded should the company experience an unfavorable rate case outcome or if unanticipated changes were made to the regulatory compact that currently provides for timely recovery of costs and this were to lead to the company's ratios of CFO pre-WC to debt and retained cash flow to debt dropping below 20% and 15%, respectively, for an extended period of time.

Rating Factors

Louisville Gas & Electric Company

Regulated Electric and Gas Utilities Industry [1][2]	**LTM 09/30/2013**	**Moody's 12-18 month Forward View* As of November 2013**

	Measure	Score		Measure	Score
Factor 1: Regulatory Framework (25%)	Measure	Score		Measure	Score
a) Regulatory Framework	Baa	Baa			Baa
Factor 2: Ability To Recover Costs And Earn Returns (25%)					
a) Ability To Recover Costs And Earn Returns		A			A
Factor 3: Diversification (10%)					
a) Market Position (5%)		Baa			Baa
b) Generation and Fuel Diversity (5%)		B			B
Factor 4: Financial Strength, Liquidity And Key Financial Metrics (40%)					
a) Liquidity (10%)		Baa			Baa
b) CFO pre-WC + Interest/ Interest (3 Year Avg) (7.5%)	8.5x	Aaa		8-8.5x	Aaa
c) CFO pre-WC / Debt (3 Year Avg) (7.5%)	28.8%	A		24-28%	A
d) CFO pre-WC - Dividends / Debt (3 Year Avg) (7.5%)	22.8%	A		17-19%	A
e) Debt/Capitalization (3 Year Avg) (7.5%)	34.7%	A		35-37%	A
Rating:					
a) Indicated Rating from Grid		A3			A3
b) Actual Rating Assigned		Baa1			A3

* THIS REPRESENTS MOODY'S FORWARD VIEW; NOT THE VIEW OF THE ISSUER; AND UNLESS NOTED IN THE TEXT DOES NOT INCORPORATE SIGNIFICANT ACQUISITIONS OR DIVESTITURES

[1] All ratios are calculated using Moody's Standard Adjustments. [2] As of 09/30/2013(LTM); Source: Moody's Financial Metrics

MOODY'S
INVESTORS SERVICE

WP-4
Avera/McKenzie

U.S. NEWS

Fed Dials Back Bond Buying, Keeps a Wary Eye on Growth

By JON HILSENRATH and VICTORIA MCGRANE CONNECT

Updated Dec. 18, 2013 9:56 p.m. ET

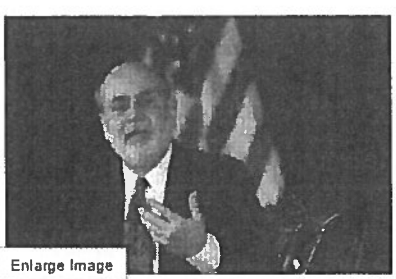
Ben Bernanke indicated that great progress has been made in recovering the U.S. economy and that the Federal Reserve is hopeful it will continue, during his final press conference as Fed chairman on Wednesday. (Photo: Getty Images)

Ben Bernanke gave the U.S. economy a nod of approval just a month before he leaves the Federal Reserve, moving the central bank to begin winding down a bond-buying program meant to boost growth with the recovery on firmer footing.

The Fed has pulled back its stimulus efforts before, only to restart them when the economy disappointed, and new challenges loom, including a surprising slowdown in inflation. But Mr. Bernanke said in his final news conference as Fed chairman that the economy was getting to a point where it needs less help.

Markets across Asia breathed a sigh of relief after the U.S. Federal Reserve started gradually pulling back on its aggressive stimulus measures. The WSJ's Jake Lee spoke to HSBC economist Leif Eskesen.

"Today's policy actions reflect the [Fed's] assessment that the economy is continuing to make progress, but that it also has much farther to travel before conditions can be judged normal," Mr. Bernanke said.



Enlarge Image

After months of wringing their hands about the implications of less Fed stimulus, investors resoundingly approved of the latest action to begin paring the $85 billion-a-month program. They were cheered in part because the move came with new Fed assurances that short-term interest rates would stay low long after the bond-buying program ends.

WP-4
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Ben Bernanke, the chairman of the Federal Reserve, speaks during his last press conference on Wednesday. *Associated Press*

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- **How the Fed Statement Changed**
- **Hilsenrath's Four Takeaways From Meeting**
- **U.S. Stocks Rise on Fed Moves**
- **Projections See No Rate Increase Until 2015**
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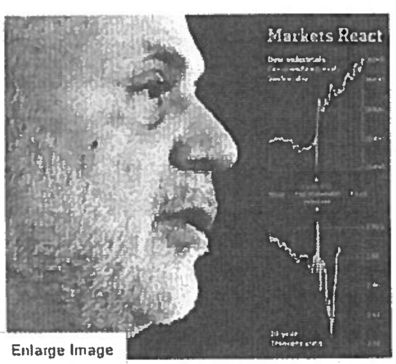
- **Federal Reserve Begins Small Taper**

During his last scheduled conference as Fed Chairman, Ben Bernanke looks back on decisions that were made and the Fed's slowness in recognizing the crisis.



Enlarge Image

The Dow Jones Industrial Average finished the day up 292.71 points, or 1.84%, at a record 16167.97. Yields on 10-year Treasury notes rose, as often happened with signs of improving growth, to 2.885%. Asian stocks rose early Thursday.

"Today's decision by the Fed is a vote of confidence in the sustainability of the economic recovery," Beth Ann Bovino, chief U.S. economist at the bond-rating firm Standard & Poor's, said in a note to clients after the decision. She pointed to a batch of stronger economic reports for October and November, in addition to reduced political uncertainty.

A budget accord, approved by the Senate on Wednesday, lays the groundwork for federal tax and spending policies in 2014 that do less to restrict economic growth than they did in 2013.

The Fed, which launched the latest round of bond buying in September 2012 in a bid to fire up the tepid recovery, will now buy $75 billion a month in mortgage and Treasury bonds as of January, down from $85 billion. That will include $35 billion monthly of mortgage securities and $40 billion of Treasurys, $5 billion less of each. It will look to cut the monthly amount of its purchases in $10 billion increments at subsequent meetings, Mr. Bernanke said.

Although the Fed expects to keep reducing the program "in measured steps" next year, the timing and the course isn't preset. "Continued progress [in the economy] is by no means certain," Mr. Bernanke said. "The steps that we take will be data-dependent."

If the Fed proceeds at the pace he set out, it would complete the bond-buying program toward the end of 2014 with holdings of nearly $4.5 trillion in bonds, loans and other assets, nearly six times as large as the Fed's total holdings when the financial crisis started in 2008.

Still, officials—worried that investors would quake at the thought of less Fed support—went to lengths to demonstrate that they would keep interest rates low for years to come, even after the bond-buying program ends.

The Fed has said it wouldn't raise short-term rates, which are now near zero, until the jobless rate gets to 6.5% or lower. It was 7% in November. In its official policy statement Wednesday, the Fed said it would keep rates near zero "well past" the point when the jobless rate hits the Fed's 6.5% marker.

In official projections released by the central bank, the vast majority of officials said they expected to keep short-term rates near zero until 2015 or later, even though they see the jobless rate hitting 6.5% next year.

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Mr. Bernanke's last day as chairman is Jan. 31. He will preside over one more policy meeting Jan. 28-29.

New challenges will confront his successor, Fed Vice Chairwoman Janet Yellen, who is expected to be confirmed by the Senate later this week to become the next Fed leader.

WSJ Global Economics Editor David Wessel joins our post coverage of the Fed's decision on interest rates to give his take on Federal Reserve Chairman Ben Bernanke's final press conference. (Photo: Getty Images)

"She fully supports what we did today," Mr. Bernanke said when asked whether Ms. Yellen could be expected to carry forward the plan he laid out.

Perhaps the biggest immediate challenge the Fed faces is inflation, which has drifted far below the central bank's 2% objective. The Fed's preferred inflation gauge, the price index for personal consumption expenditures, increased just 0.7% in October from a year prior, the Commerce Department said earlier this month. Fed officials said in their statement Wednesday that they are watching the inflation situation carefully.

WSJ's Jon Hilsenrath asks Federal Reserve Chairman Ben Bernanke if his successor Janet Yellen would continue the Federal Reserve's move to reduce its bond-buying program to $75 billion per month.

Slumping inflation could be a sign of building economic torpor, which officials want to avoid and could need to counteract with new easy-money policies. But if the Fed keeps current policies going too long, it could spark a new financial bubble.

Audio

Victoria McGrane has more on The Wall Street Journal This Morning.

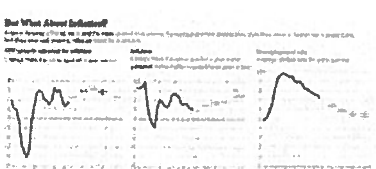
00:00 | 03:47

The bond-buying program aims to lower long-term interest rates to encourage borrowers to spend and invest. While pulling back on it, the Fed is shifting toward relying more on providing verbal guidance to the public about where short-term interest rates are likely to be in the future. One reason for the shift: Officials are more familiar with managing short-term rates than long-term rates.

The Fed's growing emphasis on assuring low short-term rates comes with its own risks. Some economists believe the Fed erred between 2003 and 2006 when it also kept short-term interest rates low and provided investors with assurances rates wouldn't move up swiftly. The policy during that period might have led to too much risk-taking and borrowing, though economists disagree on that point.

In their latest economic projections, also out Wednesday, 12 of 17 Fed officials who participated in the policy meeting said they expected their benchmark short-term rate to be at or below 1% by the end of 2015. Ten of 17 officials expected the rate to be at or below 2% by the end of 2016.

But What About Inflation?



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On the decision to pull back on the bond-buying program, nine of the 10 voting members of the Fed's policy-making committee supported the move. Boston Fed President Eric Rosengren dissented because he believes that with the jobless rate still elevated and inflation running below the 2% target, changes to the bond-buying program "are premature until incoming data more clearly indicate that economic growth is likely to be sustained above its potential rate."

Mr. Bernanke parted with a few reflections on his eight-year tenure as Fed chairman. On several occasions he noted that the Fed has battled headwinds to the economy that have

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made its job more difficult, including the combination of government spending cuts and tax increases that slowed growth in the short run. He wanted that fiscal austerity spread out over a much longer period.

When asked about the budget deal that cleared the Senate Wednesday, Mr. Bernanke said it's "certainly a better situation" than in October, when budget battles resulted in a government shutdown and fears of a federal debt default. The Fed held off on reducing the bond program in September in part because of worries about the consequences of these fiscal battles.

He took some blame for failing to foresee the 2008 financial crisis that has dominated his tenure at the central bank. "Obviously, we were slow to recognize the crisis. I was slow to recognize the crisis," he said. "That said, we've done everything we could think of" since then to strengthen the financial system and economy.

He and his wife plan to stay in Washington for some time after he steps down, he said.

Write to Victoria McGrane at victoria.mcgrane@wsj.com and Jon Hilsenrath at jon.hilsenrath@wsj.com

I. Federal Reserve's Bond-Buying Fades, but Stimulus Doesn't End There

By BINYAMIN APPELBAUMJUNE 19, 2014

WASHINGTON — THE Federal Reserve is poised to keep purchasing large volumes of mortgage bonds, and potentially Treasury securities too, even after the likely conclusion of its prominent bond-buying program later this year.

It is a prospect that reflects both the breadth of the Fed's campaign to stimulate the economy — one initiative ending, others still running — and the concern among many Fed officials that the central bank should not pull back too quickly.

The Fed is gradually curtailing the expansion of its enormous portfolio of Treasuries and mortgage bonds, from $85 billion a month last year to $35 billion a month starting in July. It plans to end the expansion by the end of the year.

At the same time, however, the Fed reinvests billions of dollars from maturing securities — about $16 billion each month this year — to maintain the size of its holdings.

The Fed once planned to stop reinvesting, allowing its holdings to dwindle, soon after it ended the expansion of the portfolio. In 2011, the Fed said this would be its first signal that it was winding down the stimulus campaign. But there is growing support among Fed officials to preserve the portfolio's size instead.

Photo

Janet L. Yellen sees evidence that low borrowing costs can improve the pace of growth. Credit Jonathan Ernst/Reuters

"Ending reinvestments as an initial step risks inadvertently bringing forward any tightening of financial conditions, as this might foreshadow the impending lift-off date for rates in a manner inconsistent with the committee's intention," William C. Dudley, the influential president of the Federal Reserve Bank of New York, said last month.

Continuing to reinvest could also help to keep borrowing costs low.

Fed officials generally argue that the effect of bond buying on the economy is determined by the Fed's total holdings, not its monthly purchases. In this view, reinvestment would preserve the effect of the stimulus campaign.

By contrast, some analysts and academics see the flow of purchases as more important. A 2013 analysis by Arvind Krishnamurthy, an economist at Northwestern University, and Annette Vissing-Jorgensen, an economist at the University of California, Berkeley, found that buying bonds was beneficial, while holding bonds mattered little. In this view, reinvestment would provide a continuing jolt to the economy.

In either case, the benefits would be relatively modest in the short term, because the volume of reinvestment is likely to reach a low point in the next year, even as the Fed's holdings — now more than $4 trillion — remain at a historic high.

The Fed in recent years has almost completely replaced its inventory of short-term government debt with longer-term securities that do not begin to mature until 2016. It has reinvested just $332 million in Treasuries so far this year, and would need to reinvest just $4 billion in 2015, according to calculations by Lou Crandall, chief economist for Wrightson ICAP, a financial research firm in New Jersey.

Reinvestment of mortgage bonds is also in decline. The Fed received and reinvested about $24 billion a month as borrowers refinanced loans or sold homes in 2013. But as interest rates have ticked upward, prepayments have declined. Reinvestment averaged $16 billion a month during the first six months of 2014, and Mr. Crandall estimates that the volume will stabilize a little below that level next year.

effect of their operations," he said. "But for 2015, it's largely symbolic."

That would change, however, in early 2016. Mr. Crandall calculates that $39 billion in Treasuries will mature in February that year, and about $177 billion during the rest of the year. Reinvesting those amounts would have a significant effect, he said.

Among Fed officials, the debate over reinvestment has become a proxy for the broader debate about how quickly the Fed should end its stimulus campaign. The Fed's chairwoman, Janet L. Yellen, and her allies, including Mr. Dudley, see clear evidence that low borrowing costs can still help to improve the pace of growth, and they have sought to extend the Fed's stimulus campaign accordingly.

Eric S. Rosengren, president of the Federal Reserve Bank of Boston and a strong proponent of the stimulus, suggested this month that the Fed could taper its reinvestments just as it has gradually slowed the expansion of its portfolio.

“If the economy was substantially stronger or substantially weaker than was expected, the reinvestment program would need adjustment,” he said.

Officials also have come to accept the bond holdings as a fact of life. In 2011, when the Fed first described its exit plans — which at the time it expected to enact much more quickly — officials believed that reducing the Fed’s bond holdings was a necessary step to maintain control of inflation. They now insist other tools will serve the purpose, and that the size of the balance sheet doesn’t really matter.

John Williams, president of the Federal Reserve Bank of San Francisco, said at a news conference last month that the reinvestment issue was simply “not that important” and that changing the policy would just create a distraction.

“My view is that we want to keep the communication as clear as possible,” he said.

Indeed, some officials argue that raising short-term interest rates may be a more important measure to prepare for future downturns than reducing the Fed’s bond holdings.

Already, the current recovery has run longer than the average period of growth between recessions since the Great Depression. And with short-term rates near zero, the Fed has little ability to respond if the economy falters.

“It would be desirable to get off the zero lower bound in order to regain some monetary policy flexibility,” Mr. Dudley said in a speech last month before the New York Association for Business Economics. “In my opinion, this is far more important than the consequences of the balance sheet being a little larger for a little longer.”

A version of this news analysis appears in print on June 20, 2014, on page B4 of the New York edition with the headline: The Fed’s Bond-Buying Is Winding Down, but Its Stimulus Doesn’t End There.

I. Press Release

Release Date: September 17, 2014

For immediate release

Information received since the Federal Open Market Committee met in July suggests that economic activity is expanding at a moderate pace. On balance, labor market conditions improved somewhat further; however, the unemployment rate is little changed and a range of labor market indicators suggests that there remains significant underutilization of labor resources. Household spending appears to be rising moderately and business fixed investment is advancing, while the recovery in the housing sector remains slow. Fiscal policy is restraining economic growth, although the extent of restraint is diminishing. Inflation has been running below the Committee's longer-run objective. Longer-term inflation expectations have remained stable.

Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee expects that, with appropriate policy accommodation, economic activity will expand at a moderate pace, with labor market indicators and inflation moving toward levels the Committee judges consistent with its dual mandate. The Committee sees the risks to the outlook for economic activity and the labor market as nearly balanced and judges that the likelihood of inflation running persistently below 2 percent has diminished somewhat since early this year.

The Committee currently judges that there is sufficient underlying strength in the broader economy to support ongoing improvement in labor market conditions. In light of the cumulative progress toward maximum employment and the improvement in the outlook for labor market conditions since the inception of the current asset purchase program, the Committee decided to make a further measured reduction in the pace of its asset purchases. Beginning in October, the Committee will add to its holdings of agency mortgage-backed securities at a pace of $5 billion per month rather than $10 billion per month, and will add to its holdings of longer-term Treasury securities at a pace of $10 billion per month rather than $15 billion per month. The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction. The Committee's sizable and still-increasing holdings of longer-term securities should maintain downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative, which in turn should promote a stronger economic recovery and help to ensure that inflation, over time, is at the rate most consistent with the Committee's dual mandate.

The Committee will closely monitor incoming information on economic and financial developments in coming months and will continue its purchases of Treasury and agency mortgage-backed securities, and employ its other policy tools as appropriate, until the outlook for the labor market has improved substantially in a context of price stability. If incoming information broadly supports the Committee's expectation of ongoing improvement in labor market conditions and inflation moving back toward its longer-run objective, the Committee will end its current program of asset purchases at its next meeting. However, asset purchases are not on a preset course, and the Committee's decisions about their pace will remain contingent on the Committee's outlook for the labor market and inflation as well as its assessment of the likely efficacy and costs of such purchases.

To support continued progress toward maximum employment and price stability, the Committee today reaffirmed its view that a highly accommodative stance of monetary policy remains appropriate. In determining how long to maintain the current 0 to 1/4 percent target range for the federal funds rate, the Committee will assess progress--both realized and expected--toward its objectives of maximum employment and 2 percent inflation. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial developments. The Committee continues to anticipate, based on its assessment of these factors, that it likely will be appropriate to maintain the current target range for the federal funds rate for a considerable time after the asset purchase program ends, especially if projected inflation continues to run below the Committee's 2 percent longer-run goal, and provided that longer-term inflation expectations remain well anchored.

When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent. The Committee currently anticipates that, even after employment and inflation are near mandate-consistent levels, economic conditions may, for some time, warrant keeping the target federal funds rate below levels the Committee views as normal in the longer run.

Voting for the FOMC monetary policy action were: Janet L. Yellen, Chair; William C. Dudley, Vice Chairman; Lael Brainard; Stanley Fischer; Narayana Kocherlakota; Loretta J. Mester; Jerome H. Powell; and Daniel K. Tarullo. Voting against the action were Richard W. Fisher and Charles I. Plosser. President Fisher believed that the continued strengthening of the real economy, improved outlook for labor utilization and for general price stability, and continued signs of financial market excess, will likely warrant an earlier reduction in monetary accommodation than is suggested by the Committee's stated forward guidance. President Plosser objected to the guidance indicating that it likely will be appropriate to maintain the current target range for the federal funds rate for "a considerable time after the asset purchase program ends," because such language is time dependent and does not reflect the considerable economic progress that has been made toward the Committee's goals.

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U.S. EDITION Friday, July 26, 2013 As of 10:45 AM EDT

July 26, 2013, 10:45 a.m. ET

IMF Urges 'Improved' U.S. Fed Policy Transparency as It Mulls Easy Money Exit

By Ian Talley

WASHINGTON--The International Monetary Fund Friday urged greater clarity from the U.S. Federal Reserve as the central bank considers its exit strategy from a long period of easy money policies.

A lack of Fed clarity could cause a major spike in borrowing costs that could cause severe damage to the U.S. recovery and send destructive shockwaves around the global economy, the IMF said in its annual assessment of the American economy.

"Improved transparency" and "enhanced policy communications with the public are vitally important prior to and during the exit," IMF staff, including a former New York Fed economist, said in the report.

The fund estimated that investor fears of a premature Fed exit from easy money policies could cause a spike of at least 125 basis points in 10-year Treasury bonds, especially if markets are uncertain about the central bank's plans. The estimate was based on markets mistakenly assuming the Fed would start scaling back its easy money policies two quarters sooner than the IMF assumes is healthy.

IMF chief Christine Lagarde said in recent weeks the fund advises the Fed maintain its $85 billion-a-month bond-buying until at least the end of 2013. That is in contrast to the Fed, which has said it is considering an earlier wind-down of its buying, if the economy shows improvement.

Still, central bank officials are expected at their meeting next week to discuss whether to refine or revise their guidance to the public on their future plans.

The IMF's comments come as the world's top finance officials last week said stimulating growth was the highest priority, trumping the need in some advanced economies to cut debt levels in the near term. It also follows fears, particularly from emerging markets, about sudden market moves sparked by the Fed's guidance that hurt their economies.

The fund warned in its review of the euro-zone economy Thursday that an early Fed exit could create more headwinds for the currency union already bogged down in a deepening recession.

The IMF also said the U.S. dollar is mildly overvalued, up to 10% higher than fundamentals suggest it should be.

After years of extraordinarily low interest rates meant to spur a weak economy, the Fed is considering how and when to start returning its policies back to normal. Signals of that policy course change earlier this year prompted investors around the globe to reshuffle their portfolios. That sudden shift in capital created volatility in currency, bond and equity markets around the globe.

The IMF said clearer Fed guidance can give markets time to adjust.

But, it added, "A smooth and gradual upward shift in the yield curve might be difficult to engineer, and there could be periods of higher volatility when longer yields jump sharply--as recent events suggest."

Fed officials told the fund they have beefed up surveillance of potential risks from the exit and low interest rates, telling the IMF they are prepared to boost their buying if needed and can use their financial regulation tools to nip problems in the bud.

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U.S. NEWS

Yellen Debut Rattles Markets

Wary Investors Seize on New Fed Chief's Mixed Message on Pace of Rate Increases

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By JON HILSENRATH and VICTORIA MCGRANE CONNECT

Updated March 19, 2014 8:13 p.m. ET

At a news conference, Federal Reserve Chairwoman discusses why the Fed moved to alter its guidance on interest rates. Photo: AP.

Investors bristled after Janet Yellen emerged from her first meeting as Federal Reserve chairwoman with some unsettling signals about the central bank's outlook for short-term interest rates.

The Fed intends to keep short-term rates near zero into next year, but investors sniffed out signs that rate increases might come a bit sooner and be a touch more aggressive than expected. Even though the Fed's official policy statement sought to give assurances of continued low rates far into the future and Ms. Yellen played down rate-increase expectations, stock prices fell and longer-term rates on Treasury bonds moved up.

In a press conference after the meeting, Ms. Yellen suggested that interest-rate increases might come about six months after the bond-buying program ends—a conclusion that could come this fall. She offered that projection with many caveats, but some investors took it as a sign that the Fed could start raising interest rates sooner than expected.

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- Majority Still Expect No Rate Hike Until 2015

"This could have been a rookie gaffe on Yellen's part," Paul Edelstein, director of financial economists at IHS Global Insight, said in a note to clients. "This was, after all, her first press conference."

In futures markets, prices indicated investors' expected rate for the Fed's benchmark federal funds rate for June 2015 moved up from 0.28% before the Fed's meeting to 0.36% after the meeting.

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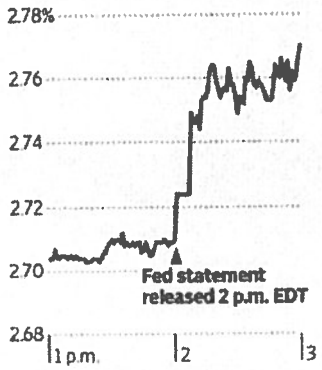
Bond Jolt

Yield on the 10-year Treasury note Wednesday



Source: FactSet
The Wall Street Journal

At her first press conference as Federal Reserve Chairwoman, Janet Yellen is asked how long before the Fed increases interest rates as it winds down its bond-buying program. Photo: Associated Press

The market response was emblematic of the market's hypersensitivity to the Fed's interest-rate decisions after seven years of aggressive central-bank action to stabilize and strengthen the economy.

It is also emblematic of the challenge Ms. Yellen faces as she takes charge at the Fed. As the economy gets on a stronger footing, the Fed is gradually stepping back from its easy-money stance, but if it moves back too quickly, it could undercut the recovery it has been working to support.

"We will try as hard as we can not to be a source of instability here," Ms. Yellen said in response to a question about the Fed's communications in her first postmeeting press conference since taking the Fed's helm last month.

The Dow Jones Industrial Average finished down 114.02 points, or 0.7%, at 16222.17. Yields on 10-year Treasury notes rose 0.096 percentage point to 2.770%.

"It just tells you how nervous bond investors are on rising rates," said Gary Pollack, who helps oversee $12 billion as head of fixed-income trading in New York at Deutsche Bank AG's private wealth management unit.

The Fed took several actions at the meeting. First, it pulled back to $55 billion from $65 billion its monthly bond-buying program, which is aimed at holding down long-term interest rates in hopes of boosting spending, hiring and growth. It was the third reduction in the bond purchases since December.

The central bank also rewrote its guidance about the likely path of short-term interest rates, putting less weight on the unemployment rate as a signpost for when rate increases will start. It said instead that the Fed would look at a broad range of economic indicators in deciding when to start raising short-term rates from near zero, where they have been since December 2008.

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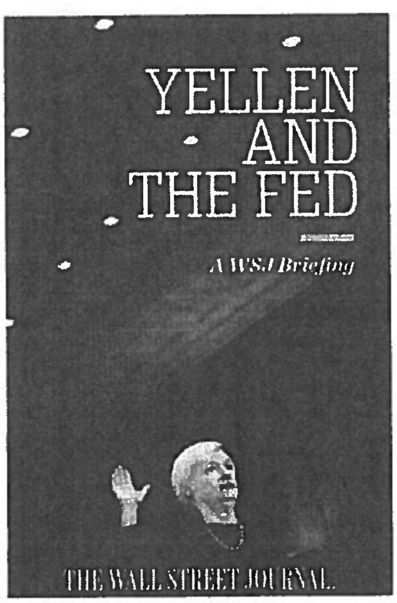
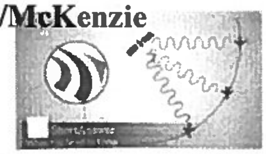


Agence France-Presse/Getty Images

The Fed has been linking its interest-rate decisions since December 2012 to the path of the unemployment rate, saying it wouldn't even consider interest-rate increases as long as the jobless rate was above 6.5%. With the unemployment rate approaching that threshold—it was 6.7% in February—the Fed set out new guidelines for the interest-rate outlook.

The Fed said it would be watching a "wide range of information," including measures of job market conditions, inflation and financial market developments. Ms. Yellen mentioned 10 different labor-market indicators she is watching, including the share of workers who have been unemployed for six months or more, the share of adults who are holding or seeking jobs, the portion of workers who hold part-time jobs but say they would rather have full-time occupations and the rate at which

Pings Revealed the Flight's Path



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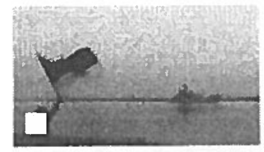

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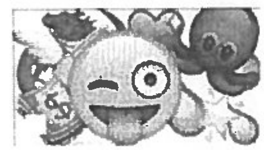

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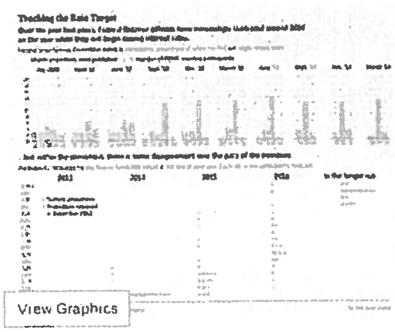
DOWNLOAD: What will Central Bank policy look like under Federal Reserve Chairwoman Janet Yellen's leadership? Read more in this free WSJ eBook.

people are quitting jobs.

The Fed took several steps to assure investors that interest rates won't rise soon and that when rates do start rising the increases will be gradual and limited. For example, the Fed's official policy statement included a new line noting that officials expect to keep rates lower than normal even after inflation and employment return to their longer-run trends.



"Economic conditions may, for some time, warrant keeping the target federal funds rate below levels the [Fed] views as normal in the longer run," the Fed said in its policy statement.

In normal times, the fed funds rate is around 4%. Because of various factors weighing on growth, the Fed's official policy statement indicated the fed funds rate isn't likely to return to that 4% level in the foreseeable future.

However, investors seized on some signs that the Fed was expecting slightly more aggressive interest-rate increases than it was a few months ago. For instance, as a supplement to its official policy statement, the Fed released new economic projections by the 16 officials who attended the policy meeting. The median projection for short-term rates at the end of 2015—meaning half of projections were above and half were below—was 1%. That is a small increase from a 0.75% median estimate in December. The median for 2016 moved from 1.75% to 2.25%.

Ms. Yellen played down the shifting projections. "These dots are going to move up and down," she said of the interest-rate projections, adding that the policy statement was a more important guide to the Fed's plans.

That policy statement said the Fed's stance on interest rates hadn't changed. Still, some analysts took a different message.

"It is the clearest sign yet," Harm Bandholz, chief U.S. economist with UniCredit Research, said in a note to clients, "that the tendency for later and later rate hikes that dominated over the past couple of years might have come to an end."

Federal Reserve chairwoman Janet Yellen's opening remarks on the Fed's statement and decision to make a reduction in the pace of its purchases of longer term securities and its move to alter its guidance on the likely path of interest rates. Photo: Getty Images.

Investors got a somewhat mixed message on the economy. Ms. Yellen acknowledged that officials might have been too optimistic about the economic outlook early in the year. But she and other officials largely stuck to their projections for how growth and inflation will unfold in the coming years.

Fed officials see inflation slowly returning from nearly 1% recently to 2% in the years ahead and the economy reaching a growth rate around 3% or a little less. They reduced their estimates for the unemployment rate, which they see falling to between 6.1% and 6.3% by year-end, from 6.7% in February. They attributed recent sluggishness in growth in part to "adverse weather conditions."

Officials, however, remain deeply worried about longer-running headwinds to the economy. Ms. Yellen said these headwinds include many households' limited access to credit because of tarnished credit histories and homes that are worth less than their mortgages. She said some Fed officials also see the recovery weighed down by

WSJ Chief Economics Correspondent Jon Hilsenrath

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discusses the Federal Reserve's move to alter its guidance on the likely path of interest rates, putting less weight on the unemployment rate as a sign for when rate increases will start. Photo: Getty

weakness in the global economy, restrictive U.S. tax and spending policies and persistent business caution.

"We've lived through a devastating financial crisis that has taken an exceptional toll on the economy in many ways," she said.

Ms. Yellen faced one dissent in her first meeting, that of Minneapolis Fed President Narayana Kocherlakota. He has been a strong proponent of offering assurances that the Fed will keep rates low until the jobless rate gets much lower. He believed the shift away from such guideposts hurt the Fed's credibility and "fosters policy uncertainty," according to the Fed's policy statement.

—Alexandra Scaggs contributed to this article.

Write to Victoria McGrane at victoria.mcgrane@wsj.com and Jon Hilsenrath at jon.hilsenrath@wsj.com

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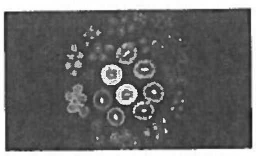

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Prospects for and Ramifications of the Great Central Banking Unwind

William Poole

At the CFA Institute Global Investment Risk Symposium held in Washington, DC, on 7–8 March 2013, William Poole gave a presentation on what he calls the "great central banking unwind." Total assets on the balance sheets of the U.S. Federal Reserve and European Central Bank have exploded since 2008. The challenges and pressure faced by these and other central banks will probably have serious consequences for the global economy.

I am very uneasy about the current economic and fiscal situation in the United States and Europe. The central bank policies and fiscal disequilibrium in these countries are unlike any circumstances they have endured in the past; it is uncertain how the massive easing of the last five years is going to affect the developed nations' economies as well as the global economy. The world is in uncharted territory.

I am going to focus on the U.S. Federal Reserve System and the European Central Bank (ECB). The Fed is the most important central bank in the world: Without stability in the United States, the world economy will not have stability. Not only must central banks navigate the challenges presented by slower growth and fiscal deficits, but they also face powerful political pressures that, if succumbed to, may have harmful consequences domestically and globally.

Fed Issues vs. ECB Issues

Although both the United States and the eurozone had significant economic downturns and financial disruption during the financial crisis, the Fed's expansionary monetary policy has been motivated primarily by a concern over unemployment whereas the ECB's policy has been motivated by an effort to support the sovereign debt of fiscally weak governments—in particular, the southern European countries.

Figure 1 shows the Fed's balance sheet assets from 2007 to 2013. Before the financial crisis, its assets were around $850 billion; they have now risen to nearly $3 trillion, and the Fed keeps pumping money into the system. It is unclear when the Fed's policy of easing is going to stop or how it is going to be reversed.

But the Fed is not alone. The ECB has been pumping funds into the European markets, as shown in **Figure 2**. Total assets on the ECB's balance sheet have increased from about €1.2 trillion in 2007 to about €3 trillion in the first quarter of 2013. The Bank of England (BOE) and a number of other central banks have been following suit. A massive monetary expansion has taken place over the last five years.

The ECB is acting as a lifeboat for sinking public finances after a collision of high levels of entitlement spending and sustained low economic growth. The plight of Greece in 2012 has led the way; other nations, Italy prominent among them, will most certainly follow. Greece was unable to raise needed funds by issuing sovereign debt after December 2008 because investors would no longer buy it; the risk of default was too high.

Great Fed Unwind

Given the very large buildup of assets on its balance sheet, it might appear that the Fed has to unwind the position, but that is not necessarily the case. The Fed might keep a very large portfolio indefinitely.

Reserve Ratio. The monetary mechanism that the Fed, or any central bank, uses to control the growth of money and credit is completely different from what it was in the past. The Fed's main instrument of controlling money and credit growth in the past was the reserve requirement, which sets

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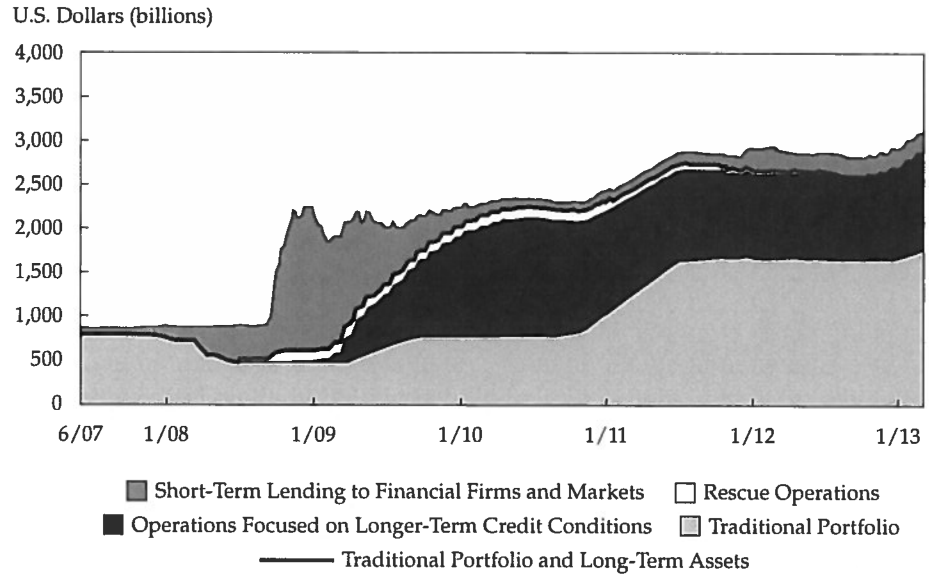
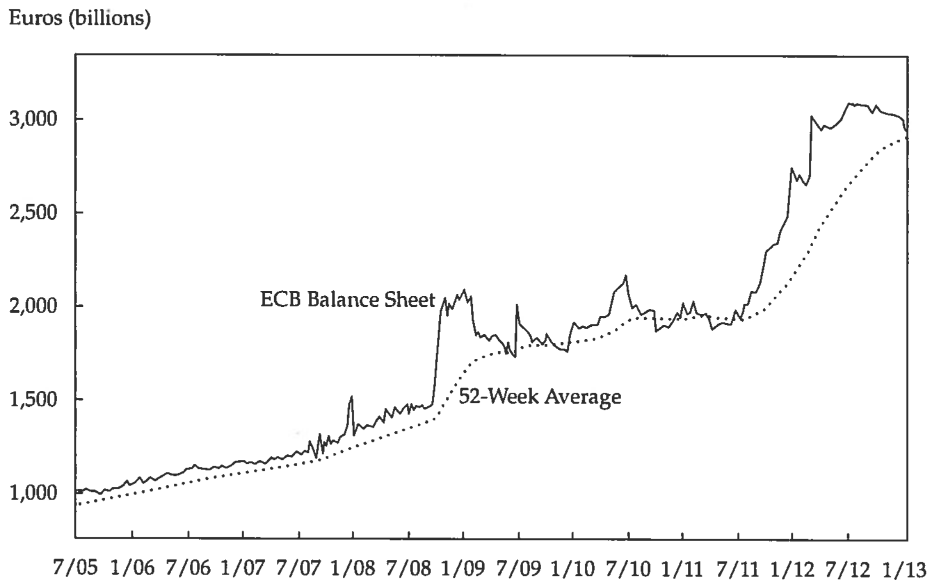
Figure 1. U.S. Federal Reserve Balance Sheet Assets, June 2007–February 2013



Source: Based on a figure from the Federal Reserve Bank of St. Louis, "U.S. Financial Data" (22 February 2013):7.

Figure 2. ECB Balance Sheet Assets, 2005–2013



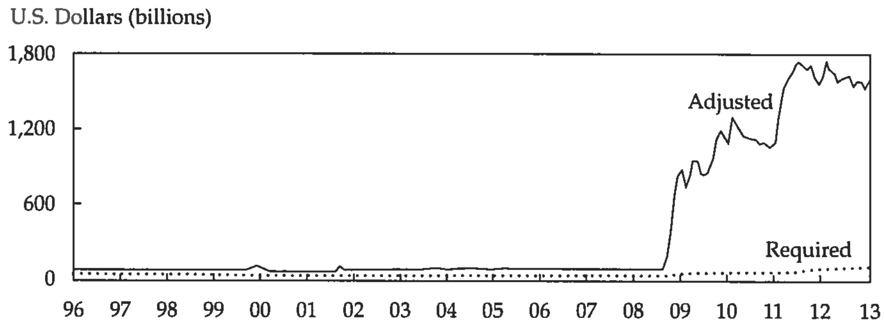
Sources: Based on data from Gold Silver Worlds and Weldon Financial.

forth the amount of reserves that banks had to keep on deposit with the Fed. The amount of a bank's deposits with the Fed is a percentage of its total demand deposits.

Today, banks are no longer constrained by the reserve ratio. In the past, the Fed had no authority to pay interest on bank reserves, so banks typically held only the minimum amount of reserves required. But in 2008, new legislation gave the Fed the authority to pay interest on reserves, which the Fed has currently set at the rate of 0.25%. That rate is above other money market rates and thus has provided an incentive for banks to increase their excess reserves at the Fed.

Figure 3 shows the dramatic increase in bank reserves since mid-2008; as of 20 February 2013, they are now more than $1.5 trillion. Given the latest round of quantitative easing (QE) by the Federal Reserve, these bank reserves will continue to grow. The dotted line in Figure 3 represents the amount of required reserves, which contrasts markedly with the enormous stockpile of excess reserves sitting

Figure 3. Adjusted and Required Federal Reserves, January 1996–February 2013



Source: Based on a figure from the Federal Reserve Bank of St. Louis, "Monetary Trends" (26 February 2013):6.

on bank balance sheets. Banks are holding these reserves rather than lending them or buying assets with them because the Fed is paying interest on them. Reserves are the raw material for a money and credit expansion, but this raw material is not being actively used. To date, money and credit growth has been moderate. There are no signs of overheating, and the same is true for inflation expectations.

Two measures of the money supply—money zero maturity (MZM) and M2—are plotted in **Figure 4** from 1996 through mid-February 2013. M2 is calculated as M1 (all physical money, such as coins and currency, plus demand deposits, or checking accounts, and Negotiable Order of Withdrawal accounts) plus time deposits, savings deposits, and noninstitutional money market funds. MZM is defined as the liquid money supply in an economy—all assets convertible to cash on demand without penalty. The bigger area of shading at the right is the most recent recession, drawn from the cycle peak in December 2007 to the cycle trough in June 2009. The smaller area of shading on the left represents the much milder recession in 2001. Money stock growth measured by both definitions has recently been well within the normal range.

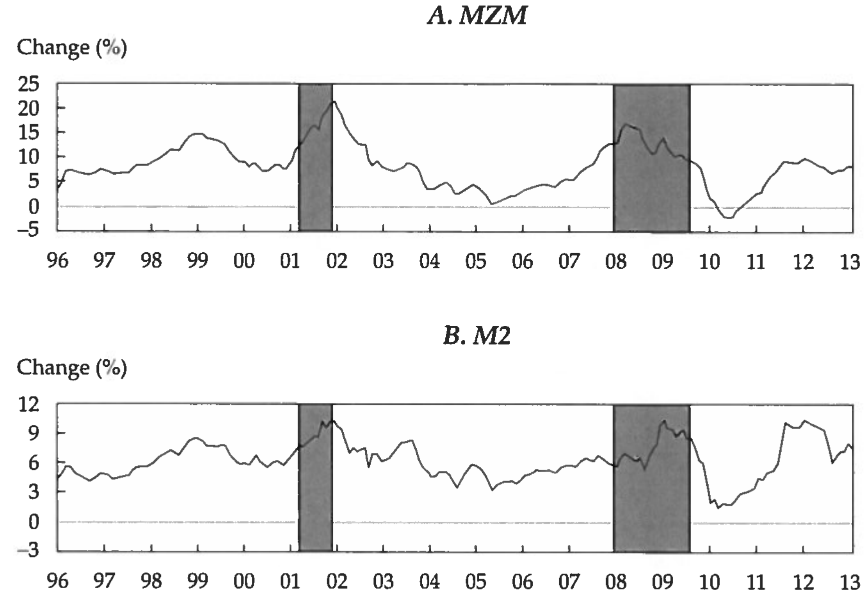
Inflation expectations can be measured in a number of ways, but I prefer a market-based measure to a survey measure. A market-based measure is derived from the spread between inflation-indexed Treasury bonds and conventional bonds. **Figure 5** compares yields in percentage terms for three different maturities: 5, 10, and 30 years. The spread between the conventional and indexed bonds stays in a relatively tight range from December 2011 to February 2013, and the spreads at the 10-year mark are in the same range they have been in for the past 10–12 years.

Raising the Federal Funds Rate. If inflation starts to rise, the Federal Reserve's standard strategy is to raise its target for the federal funds rate, which is the interest rate on interbank lending and borrowing. Federal funds are nothing more than bank reserves; banks are able to lend the reserve balances they have on account at the Fed. Now that the Fed pays interest on bank reserves, the interest rate on bank reserves is tied, almost to the basis point, to the federal funds rate. The Fed cannot raise the federal funds rate without also raising the rate that it pays on bank reserves, and at some point, the rate increases must be large enough to persuade banks to hold reserves rather than engage in an excessive expansion of money and credit that would create an inflation problem.

Despite all of the progress the financial industry has made in terms of modeling and statistical technology, the Fed basically decides how much to raise the federal funds rate in the same manner that a driver attempts to hold a steady speed when driving in mountainous territory. If the car is going too fast down the mountain, the driver eases up on the accelerator. If that action isn't enough, the driver eases up more and maybe taps the brakes. Likewise, the Fed reduces its assets to drive up interest rates, but the required pace of reduction is not clear *ex ante*. The basic idea is simple: If the economy is growing too fast, the Fed taps on the monetary policy brake by increasing interest rates. The Fed then adjusts its policy based on feedback and observation of recent data.

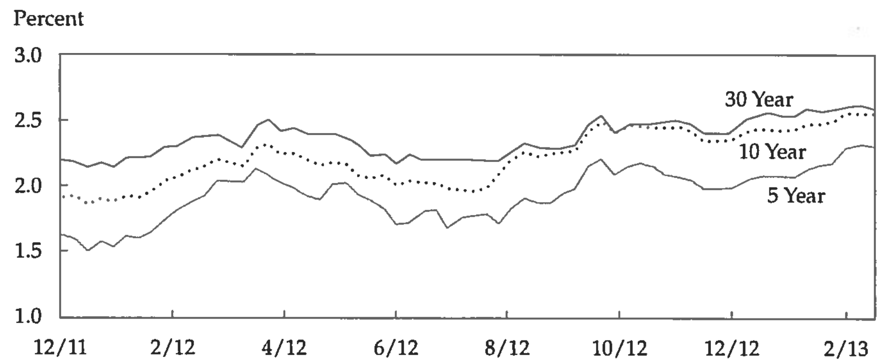
Forecasts. Everyone who deals with portfolio management knows that an action taken in response to a problem depends on the decision maker's belief about a forecast. And when making decisions, it is easy to be in denial about the most recent information. Likewise, if the Fed starts to see inflation while the unemployment rate is still high, it may choose to deny reality and take the position that the inflation bump is a temporary aberration, perhaps related to energy prices or some other issue.

Figure 4. Change in Two Measures of the Money Supply, January 1996–February 2013



Note: Change is the percentage change from one year ago.
Source: Based on a figure from the Federal Reserve Bank of St. Louis, "Monetary Trends" (26 February 2013):4.

Figure 5. Inflation-Indexed Treasury Yield Spreads, December 2011–February 2013



Note: Data represent averages of daily figures.
Source: Based on a figure from the Federal Reserve Bank of St. Louis, "U.S. Financial Data" (22 February 2013):12.

Such inaction on the part of the Federal Reserve might be motivated by a desire to avoid tightening policy too soon because of an overriding interest in and responsibility for advancing the rate of employment growth. But if the Fed is in denial too long, inflation can become embedded in the economy. One of the best examples of Fed inflation denial is illustrated by monetary policy from roughly 1965 to 1979; Paul Volcker took over as chairman of the Fed in August 1979 to deal with the inflation. After 1965, the Fed was concerned that tighter policy would choke off employment growth, so it allowed inflation to creep up and up until the creep became a gallop.

Political Pressure. The Fed is also likely to face political pressure to raise rates only slowly. Federal Reserve chairman Ben Bernanke talks a lot about risk management and the tradeoff between benefits and costs; he maintains that the need to balance these two issues justifies proceeding with the current policy. But Bernanke does not discuss the risk of political intervention in Fed policy despite numerous examples of the Fed giving in to political pressure and waiting too long to change its policy, which results in a detrimental outcome for the economy.

Mortgage finance interests have been extremely well organized politically and are quite influential.

Part of the Fed's QE policy is to buy $40 billion of mortgage-backed securities (MBSs) a month. Stopping that part of its expansionary policy—without even considering unwinding the portfolio—will produce a lot of political pushback. This pushback will come through the housing and mortgage interests, through representatives in Congress, and perhaps through the president. Essentially, pressure on the Fed will come from inside the government and may not be very visible; it may be limited to a few op-ed articles from the housing lobby. The true amount of political pressure will largely be hidden.

Pressure to keep rates low will come also from those who argue that the Fed should do its share to hold down the federal budget deficit. Higher interest rates will produce a rapid and enormous increase in the interest expense in the federal budget. The Fed is going to be encouraged to suppress interest rates until longer-run reforms can be put in place to address the budget deficit.

Recent discussion has centered on the impact of Fed policy on a number of issues. For example, is Fed policy creating a bubble in the bond or stock markets or in farmland prices? Is Fed policy pushing down the dollar exchange rate? Bubbles are easy to understand after the fact but very difficult to identify in real time. Many market fluctuations were thought to be unsustainable at the time but turned out to be justified by fundamentals. So, Fed policy may or may not be bubble inducing. But the real issue is the politics of monetary policy.

I believe that the Fed will not successfully resist the political winds that buffet it. I am not a political expert or a political analyst by trade. My qualification for speaking on this topic is that I have followed the interactions between monetary policy and politics for a very long time. As with all things political, the politics of the Fed means that realities often fail to match outward appearances.

I believe the Fed is likely to overdo its current QE policy of purchasing $45 billion of Treasuries and $40 billion of MBSs per month. Turning off the spigot would be difficult, but to be effective, the Fed has to stop its expansionary policy before inflation becomes embedded in the economy. For policy to be effective, it needs to be preemptive. Inflation control is better when accomplished before inflation has risen, not after.

Uncertainties. Although forecasts always contain uncertainties, the federal budget and regulatory uncertainties today are greater than at any time over the past 60 years. These budget and regulatory uncertainties are the prime explanation for the slowness of the economic recovery; businesses are hanging back until they better understand, or think they better understand, the way that the regulations are going to be written and interpreted. The load of regulations on the business sector is larger than it has been since the 1930s: the Affordable Care Act and the Dodd–Frank Wall Street Reform and Consumer Protection Act, as well as the policies of the Environmental Protection Agency and the Department of Labor. I think President Obama and his administration—in large part because they do not understand the markets as well as they might—will not hesitate to pressure the Fed, initially from the inside and perhaps ultimately from the outside by encouraging heavy public criticism once the Fed embarks on a policy of raising rates. Such an approach will likely be counterproductive, and the markets will respond very negatively.

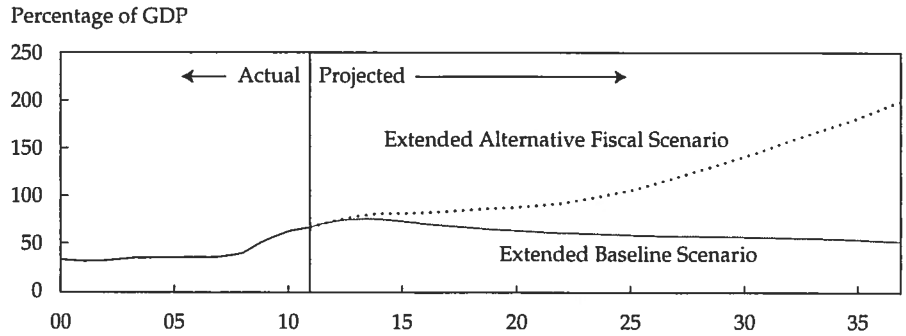
The very deep fiscal disequilibrium in the United States is best understood by looking at the data from the Congressional Budget Office (CBO). The budget games that are played with the numbers are full of screwy and misleading accounting. For example, the alternative minimum tax (AMT) was patched one year at a time so that the forward projections of revenues from the AMT would be in all the official projections of the budget. But the patchwork nature of the process created uncertainty about its final structure. Another example on the expenditure side is from more than 10 years ago: Since the Clinton years, legislation on the books has called for large reductions in Medicare reimbursements to physicians. The "doc fix" was enacted one year at a time so that the physicians would not have their reimbursements cut by a third. The budget encompassed forward projections of outlays that were lower than the outlays that would actually occur.

Figure 6 shows the federal debt forecast under two CBO long-term budget scenarios as of June 2012. This forecast is updated each summer. The dotted line shows the projected debt level over the next 25 years without the kind of budget gimmicks I just described. The shaded line shows the debt-level projection with all the budget gimmicks included. The United States is in the process of struggling with this enormous disequilibrium, although its struggle so far has been about the discretionary part of the budget, without any very serious political discussion—let alone legislative proposals—related to Social Security and Medicare expenditures, which are driving the budget. Until entitlement outlays are addressed, the budget is going to look more like the dotted line in Figure 6 than the shaded line.

Great ECB Unwind

The ECB has acquired a substantial amount of the sovereign debt of the fiscally weak southern European countries. It has also been lending to banks that have, in turn, purchased the debt of the weak

Figure 6. Federal Debt Forecast under the CBO's Long-Term Budget Scenarios, 2000–2037



Note: Forecast is as of June 2012.
Source: Based on a figure from the Congressional Budget Office, "The 2012 Long-Term Budget Outlook" (5 June 2012):2.

countries. The European banking regulations have so-called risk-weighted capital requirements, but the risk weight on all sovereign debt is zero. So, a bank can buy the bonds of Italy or Spain or even Greece and have a zero capital requirement. Obviously, the capital requirements are not truly risk weighted; they are politically weighted. The capital requirements in Europe, as in the United States, are deeply affected by the politics of bank regulation.

The situation in Europe is still very much in flux. Italy recently had a very indecisive election. The citizens of the weak nations are not embracing the austerity that is required to bring their economies back in line. They want to keep their benefits, and they do not want to pay taxes. These desires are perfectly rational but are not conducive to fiscal sustainability. So, the crisis that has long been predicted—because of much larger welfare state commitments than can be financed with an aging and retired population—has finally arrived and is by no means resolved.

The ECB cannot unwind the assets it owns unless Spain, Italy, Portugal, and Greece resolve their fiscal problems. Thus, these countries' debt might remain on the ECB's balance sheet—and the loans to these countries on European banks' balance sheets—for some time. Therefore, if Europe begins to have an inflation problem, the ECB will have its hands tied to a significant extent and will be limited in its ability to deal with rising inflation.

Europe is afraid of contagion, in which a default in one country results in investors fleeing the bond markets of the other fiscally weak countries. Thus, the weak countries remain supported by the fiscally sound countries—essentially, Germany—but Germany does not have the resources to support the weak countries indefinitely.

The ECB's charter was supposed to protect it from this situation, but the ECB has caved in to the pressure. To date, there is no evidence of inflationary problems in Europe, at least on the continent, although the United Kingdom has experienced some inflation.

It is a close call in Europe, but I believe that the fundamental fiscal weakness in Europe will end in a crisis. The European community encompasses overextended welfare states, many of which, particularly in southern Europe, have weak administration of tax law and negative politics on decreasing outlays. Many of its public enterprises are inefficient, and its labor markets are burdened by structural rigidities.

The consequences of poor fundamentals in Europe are negative economic growth and rising unemployment. It remains an open question whether Germany's voters will ultimately say that they will no longer support Italy, Spain, Portugal, and Greece. The Merkel administration has retained the support of the German people so far, but without any improvement in the situation, the time may come when Germany's voters ask themselves why they should pay for the excesses of others.

Conclusion

Because no precedents exist for the massive monetary easing that has been practiced over the past five years in the United States and Europe, the uncertainty surrounding the outcome of central bank policy is also vast. So far, inflationary pressures remain subdued, but the ability and willingness of the Fed and the ECB to react quickly to control inflation fears are in jeopardy, largely because of political forces. Total assets on the balance sheets of most developed nations' central banks have grown massively since 2008, and the timing of when the banks will unwind those positions is uncertain.

This article qualifies for 0.5 CE credit.

Question and Answer Session

William Poole

Question: Is the dual mandate of maximum employment and price stability a burden on Fed policy?

Poole: The dual mandate is not necessarily a problem. The 1977 law stated that the Fed is supposed to work toward two objectives: inflation and employment. In January 2012, the Federal Open Market Committee (FOMC) set forth the principles with which it approaches its dual mandate. At that time, the FOMC adopted an inflation target of 2%, and the target was renewed in January 2013. The published principles state that no central bank can promise to create a certain level of employment growth or a certain level of unemployment because those are real variables that are controlled by the real conditions in the economy, including such conditions as fiscal policy, and are ultimately not the responsibility of Fed policy.

Question: What is the primary weakness of the Fed?

Poole: I fault the Fed for its lack of intellectual leadership on the economy and, in particular, Bernanke's lack of forthrightness about the limits of the Fed's ability to address slow growth and fiscal disequilibrium. Most of the Federal Reserve bank presidents (with the exceptions of Charles Plosser in Philadelphia, Richard Fisher in Dallas, Jeffrey Lacker in Richmond, and to some extent, my successor in St. Louis, Jim Bullard) have been essentially silent on this issue, speaking only in vague terms about the necessity for fiscal stability and not identifying the uncertainty over that issue as a reason for the slow economic expansion.

Question: Is the Fed structured for failure?

Poole: That question is very important. Institutions need to be considered separately from the individuals who inhabit them. If certain individuals are going to make a mess of something, no institutional structure can guard against that except through a system of checks and balances. Past research has shown that central bank independence produces a better result than monetary policy run by the Treasury. Independence for the Federal Reserve began 100 years ago, when the Federal Reserve Act was signed in December 1913. The Fed's structure provides substantial independence, allowing room for strong leadership to do what has to be done in the face of adverse political pressure. The Fed's structure does not guarantee independence, but it provides the room. Paul Volcker has made significant use of that independence, whereas Arthur Burns, one of the architects of monetary policy and the inflation that culminated from it, did not. No institutional structure can guarantee a good result, but institutional structures can allow strong people to fail because they lose control.

Question: If the Fed were to adopt the equivalent of a Taylor rule today,[1] what should it be?

Poole: A simple Taylor-like rule that relates to only a couple of variables when so much is going on is unworkable at this point. An appropriate goal might be to have a central bank that is more constrained by legislative rules, but I just do not see a workable rule at this time.

Question: What is your opinion about returning to the gold standard?

Poole: I think the gold standard is unworkable. It was not as satisfactory in the 19th century, during its heyday, as is often argued. The basic problem is easy to see. When there is a flight to liquidity, when the market wants more gold, there is no more gold. The supply is fixed. All sorts of liabilities backed by gold have been issued, but those liabilities far exceed the gold supply. Therefore, the gold standard is a recipe for a banking system that collapses under stress, although it did stabilize the price level over a long period of time.

Notes

1. A Taylor rule is a monetary policy rule that stipulates how much the central bank should change the nominal interest rate in response to changes in inflation, output, or other economic conditions.

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5. Standard & Poor's
6. Morningstar
7. BARRA

Value Line is the largest and most widely circulated independent investment advisory service, and influences the expectations of a large number of institutional and individual investors. The Value Line data are commercially available on a timely basis to investors in paper format or electronically. Value Line betas are derived from a least-squares regression analysis between weekly percent changes in the price of a stock and weekly percent changes in the New York Stock Exchange Average over a period of 5 years. In the case of shorter price histories, a smaller time period is used, but 2 years is the minimum. Value Line betas are computed on a theoretically sound basis using a broadly based market index, and they are adjusted for the regression tendency of betas to converge to 1.00. This necessary adjustment to beta is discussed below.

Practical and Conceptual Difficulties

Computational Issues. Absolute estimates of beta may vary over a wide range when different computational methods are used. The return data, the time period used, its duration, the choice of market index, and whether annual, monthly, or weekly return figures are used will influence the final result.

Ideally, the returns should be total returns, that is, dividends and capital gains. In practice, beta estimates are relatively unaffected if dividends are excluded. Theoretically, market returns should be expressed in terms of total returns on a portfolio of all risky assets. In practice, a broadly based value-weighted market index is used. For example, Merrill Lynch betas use the Standard & Poor's 500 market index, while Value Line betas use the New York Stock Exchange Composite market index. In theory, unless the market index used is the true market index, fully diversified to include all securities in their proportion outstanding, the beta estimate obtained is potentially distorted. Failure to include bonds, Treasury bills, real estate, etc., could lead to a biased beta estimate. But if beta is used as a relative risk ranking device, choice of the market index may not alter the relative rankings of security risk significantly.

To enhance statistical significance, beta should be calculated with return data going as far back as possible. But the company's risk may have changed if the historical period is too long. Weighting the data for this tendency is one possible remedy, but this procedure presupposes some knowledge of how risk changed over time. A frequent compromise is to use a 5-year period with either weekly or monthly returns. Value Line betas are computed based on weekly returns over a 5-year period, whereas Merrill Lynch betas are computed with monthly returns over a 5-year period. In an empirical study of utility

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so that the current value can be widely off the mark as a measure of the expected future value.

5.4 Other Measures of Growth

The measure of expected growth in the dividend established in the previous two sections, the intrinsic growth rate, is not the only possible measure of the variable. Another plausible measure is some average of the past rates of growth in the dividend. Under our model of security valuation, dividend, earnings, and price per share all are expected to grow at the same rate. Hence, the rates of growth in the dividend, earnings, and price also are candidates for estimates of the expected rate of growth in the dividend.

Let us consider first the rate of growth in earnings per share. The earnings per share during T adjusted for stock splits and stock dividends to make interperiod comparisons valid is

$$\mathrm{AYPS}(T) = \mathrm{AFC}(T)/.5\,[\mathrm{ANS}(T) + \mathrm{ANS}(T-1)], \tag{5.4.1}$$

where ANS(T) is the number of shares outstanding at the end of T adjusted for stock splits and dividends. The rate of growth in earnings per share during T is

$$\mathrm{YGR}(T) = [\mathrm{AYPS}(T) - \mathrm{AYPS}(T-1)]/\mathrm{AYPS}(T-1). \tag{5.4.2}$$

For reasons to be given shortly, the smoothed rate of growth in earnings is superior to the current rate as a forecast of the expected rate. The smoothed rate of earnings growth is obtained from

$$Ln[1 + \mathrm{YGRS}(T)] = \lambda Ln[1 + \mathrm{YGR}(T)] + (1-\lambda)Ln[1 + \mathrm{YGRS}(T-1)], \tag{5.4.3}$$

with $\lambda = .15$ and YGRS(1953) = .04.

The primary reason for a difference between YGR and GRTH is a change in the rate of return on the common equity. To illustrate, assume a firm that has been earning a return on common of .10 and retaining one-half of its income to finance its investment. The rate of growth under both measures will be .05. If the firm's rate

of return on common rises from .10 to .11, the retention growth rate will rise from .05 to (.5)(.11) = .055. However, the earnings growth rate will rise from .05 to .155.[5] Furthermore, the earnings growth rate in subsequent periods will be .055 if the return on common remains .11. This example suggests that the intrinsic growth rate is superior to the earnings growth rate as a measure of expected growth. Investors nonetheless may look to past data on earnings growth for information on expected future growth, and it is the growth investors expect that should be used to measure share yield.

A number of considerations suggest that investors may, in fact, use earnings growth as a measure of expected future growth. First, the intrinsic growth rate includes stock financing growth as well as retention growth. The former is difficult for us to measure and may be even more difficult for investors. Consequently, investors may use past earnings growth to forecast the future since it incorporates in one statistic growth from all sources. Second, we saw that inflation will result in a rise in the allowed rate of return on equity for a regulated company. If this response to inflation takes place with a lag, that is, the regulatory agency raises RRC over time, earnings growth will reflect the forecast rate of growth better than intrinsic growth. Finally, it appears that security analysts use past growth in earnings more than any other variable to forecast future growth.

Given that earnings growth is used by investors to forecast future growth, the smoothed value of the variable YGRS is superior to the current value. The previous illustration revealed that YGR overreacts to changes in the allowed rate of return and therefore is subject to large random fluctuations. The data on YGR confirm this conclusion.

The use of dividend growth as a forecast of future growth is subject to the same limitations as earnings if the firm pays a constant fraction of its earnings in dividends. That is, under this assumption the dividend growth rate in any period is the same as the earnings growth rate. Firms tend to change their dividend rate from one

[5] Let the book value per share at the start of T be BVS($T-1$) = \$50.00. With RRC(T) = .10, AYP(T) = \$5.00, and with RETR(T) = .5, BVS(T) = \$52.50. If RRC($T+1$) = .10, AYP($T+1$) = \$5.25, and YGR($T+1$) = RTGR($T+1$) = .05. However, if RRC($T+1$) = .11, RTGR($T+1$) = (.11)(.5) = .055, while AYP($T+1$) = \$5.775, and YGR($T+1$) = (\$5.775 − \$5.00)/\$5.00 = .155.

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The average growth rate estimate from all the analysts that follow the company measures the consensus expectation of the investment community for that company. In most cases, it is necessary to use earnings forecasts rather than dividend forecasts due to the extreme scarcity of dividend forecasts compared to the widespread availability of earnings forecasts. Given the paucity and variability of dividend forecasts, using the latter would produce unreliable DCF results. In any event, the use of the DCF model prospectively assumes constant growth in both earnings and dividends. Moreover, as discussed below, there is an abundance of empirical research that shows the validity and superiority of earnings forecasts relative to historical estimates when estimating the cost of capital.

The uniformity of growth projections is a test of whether they are typical of the market as a whole. If, for example, 10 out of 15 analysts forecast growth in the 7%–9% range, the probability is high that their analysis reflects a degree of consensus in the market as a whole. As a side note, the lack of uniformity in growth projections is a reasonable indicator of higher risk. Chapter 3 alluded to divergence of opinion amongst analysts as a valid risk indicator.

Because of the dominance of institutional investors and their influence on individual investors, analysts' forecasts of long-run growth rates provide a sound basis for estimating required returns. Financial analysts exert a strong influence on the expectations of many investors who do not possess the resources to make their own forecasts, that is, they are a cause of g. The accuracy of these forecasts in the sense of whether they turn out to be correct is not at issue here, as long as they reflect widely held expectations. As long as the forecasts are typical and/or influential in that they are consistent with current stock price levels, they are relevant. The use of analysts' forecasts in the DCF model is sometimes denounced on the grounds that it is difficult to forecast earnings and dividends for only one year, let alone for longer time periods. This objection is unfounded, however, because it is present investor expectations that are being priced; it is the consensus forecast that is embedded in price and therefore in required return, and not the future as it will turn out to be.

Empirical Literature on Earnings Forecasts

Published studies in the academic literature demonstrate that growth forecasts made by security analysts represent an appropriate source of DCF growth rates, are reasonable indicators of investor expectations and are more accurate than forecasts based on historical growth. These studies show that investors rely on analysts' forecasts to a greater extent than on historic data only.

Academic research confirms the superiority of analysts' earnings forecasts over univariate time-series forecasts that rely on history. This latter category

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mendation that is different than the expected ROE that the method assumes the utility will earn forever. For example, using an expected return on equity of 11% to determine the growth rate and using the growth rate to recommend a return on equity of 9% is inconsistent. It is not reasonable to assume that this regulated utility company is expected to earn 11% forever, but recommend a 9% return on equity. The only way this utility can earn 11% is that rates be set by the regulator so that the utility will in fact earn 11%. One is assuming, in effect, that the company will earn a return rate exceeding the recommended cost of equity forever, but then one is recommending that a different rate be granted by the regulator. In essence, using an ROE in the sustainable growth formula that differs from the final estimated cost of equity is asking the regulator to adopt two different returns.

The circularity problem is somewhat dampened by the self-correcting nature of the DCF model. If a high equity return is granted, the stock price will increase in response to the unanticipated favorable return allowance, lowering the dividend yield component of market return in compensation for the high g induced by the high allowed return. At the next regulatory hearing, more conservative forecasts of r would prevail. The impact on the dual components of the DCF formula, yield and growth, are at least partially offsetting.

Third, the empirical finance literature discussed earlier demonstrates that the sustainable growth method of determining growth is not as significantly correlated to measures of value, such as stock price and price/earnings ratios, as other historical growth measures or analysts' growth forecasts. Other proxies for growth, such as historical growth rates and analysts' growth forecasts, outperform retention growth estimates. See for example Timme and Eiseman (1989).

In summary, there are three proxies for the expected growth component of the DCF model: historical growth rates, analysts' forecasts, and the sustainable growth method. Criteria in choosing among the three proxies should include ease of use, ease of understanding, theoretical and mathematical correctness, and empirical validation. The latter two are crucial. The method should be logically valid and consistent, and should possess an adequate track record in predicting and explaining security value. The retention growth method is the weakest of the three proxies on both conceptual and empirical grounds. The research in this area has shown that the first two growth proxies do a better job of explaining variations in market valuation (M/B and P/E ratios) and are more highly correlated to measures of value than is the retention growth proxy.

Best Practices in Estimating the Cost of Capital: Survey and Synthesis

Robert F. Bruner, Kenneth M. Eades, Robert S. Harris, and Robert C. Higgins

This paper presents the results of a cost-of-capital survey of 27 highly regarded corporations, ten leading financial advisers, and seven best selling textbooks and trade books. The results show close alignment among all these groups on the use of common theoretical frameworks and on many aspects of estimation. We find large variation, however, for the joint choices of the risk-free rate, beta, and the equity market risk premium, as well as for the adjustment of capital costs for specific investment risk. On these issues, we summarize arguments for different approaches and review responses in detail to glean tradeoffs faced by practitioners. [JEL: G12, G20, G31]

■ In recent decades, theoretical breakthroughs in such areas as portfolio diversification, market efficiency, and asset pricing have converged into compelling recommendations about the cost of capital to a corporation. By the early 1990s, a consensus had emerged prompting such descriptions as "traditional...textbook...appropriate," "theoretically correct," and "a useful rule of thumb and a good vehicle."[1] Beneath this general agreement about cost-of-capital theory lies considerable ambiguity and confusion over how the theory can best be applied. The issues at stake are sufficiently important that differing choices on a few key elements can lead to wide disparities in estimated capital cost. The cost of capital is central to modern finance touching on investment and divestment decisions, measures of economic profit, performance appraisal, and incentive systems. Each year in the US, corporations undertake more than $500 billion in capital spending. Since a difference of a few percent in capital costs can mean a swing in billions of expenditures, how firms estimate the cost is no trivial matter.

The purpose of this paper is to present evidence on how some of the most financially sophisticated companies and financial advisers estimate capital costs. This evidence is valuable in several respects. First, it identifies the most important ambiguities in the application of cost-of-capital theory, setting the stage for productive debate and research on their resolution. Second, it helps interested companies benchmark their cost-of-capital estimation practices against best-practice peers. Third, the evidence sheds light on the accuracy with which capital costs can be reasonably estimated, enabling executives to use the estimates more wisely in their decision-making. Fourth, it enables teachers to answer the inevitable question, "How do companies really estimate their cost of capital?"

The paper is part of a lengthy tradition of surveys of industry practice. Among the more relevant predecessors, Gitman and Forrester (1977) explored "the level of sophistication in capital budgeting techniques" among 103 large, rapidly growing businesses, finding that the internal rate of return and the payback period were in common use. Although the authors inquired about the level of the firm's discount rate, they did not ask how the rate was determined. Gitman and Mercurio (1982) surveyed 177 Fortune 1000 firms about "current practice in cost of capital measurement and utilization," concluding that

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[1]Three sets of quotes come in order from Ehrhardt Copeland, Koller, and Murrin (1990), and Brealey s (1993).

"the respondents' actions do not reflect the application of current financial theory." Moore and Reichert (1983) surveyed 298 Fortune 500 firms on the use of a broad array of financial techniques, concluding among other things, that 86% of firms surveyed use time-adjusted capital budgeting techniques. Bierman (1993) surveyed 74 Fortune 100 companies reporting that all use some form of discounting in their capital budgeting, and 93% use a weighted-average cost of capital. In a broad-ranging survey of 84 Fortune 500 large firms and Forbes 200 best small companies, Trahan and Gitman (1995) report that 30% of respondents use the capital-asset pricing model (CAPM).

This paper differs from its predecessors in several important respects. Existing published evidence is based on written, closed-end surveys sent to a large sample of firms, often covering a wide array of topics, and commonly using multiple-choice or fill-in-the-blank questions. Such an approach often yields response rates as low as 20% and provides no opportunity to explore subtleties of the topic. Instead, we report the result of a telephone survey of a carefully chosen group of leading corporations and financial advisers. Another important difference is that the intent of existing papers is most often to learn how well accepted modern financial techniques are among practitioners, while we are interested in those areas of cost-of-capital estimation where finance theory is silent or ambiguous, and practitioners are left to their own devices.

The following section gives a brief overview of the weighted-average cost of capital. The research approach and sample selection are discussed in Section II. Section III reports the general survey results. Key points of disparity are reviewed in Section IV. Section V discusses further survey results on risk adjustment to a baseline cost of capital, and Section VI offers conclusions and implications for the financial practitioner.

I. The Weighted-Average Cost of Capital

A key insight from finance theory is that any use of capital imposes an opportunity cost on investors; namely, funds are diverted from earning a return on the next best equal-risk investment. Since investors have access to a host of financial market opportunities, corporate uses of capital must be benchmarked against these capital market alternatives. The cost of capital provides this benchmark. Unless a firm can earn in excess of its cost of capital, it will not create economic profit or value for investors.

A standard means of expressing a company's cost of capital is the weighted-average of the cost of individual sources of capital employed. In symbols, a company's weighted-average cost of capital (or WACC) is

$$WACC = (W_{debt}(1-t)K_{debt}) + (W_{preferred}K_{preferred}) + (W_{equity}K_{equity}) \qquad (1)$$

where

K = component cost of capital
W = weight of each component as percent of total capital
t = marginal corporate tax rate

For simplicity, this formula includes only three sources of capital; it can be easily expanded to include other sources as well.

Finance theory offers several important observations when estimating a company's WACC. First, the capital costs appearing in the equation should be current costs reflecting current financial market conditions, not historical, sunk costs. In essence, the costs should equal the investors' anticipated internal rate of return on future cash flows associated with each form of capital. Second, the weights appearing in the equation should be market weights, not historical weights based on often arbitrary, out-of-date book values. Third, the cost of debt should be after corporate tax, reflecting the benefits of the tax deductibility of interest.

Despite the guidance provided by finance theory, use of the weighted-average expression to estimate a company's cost of capital still confronts the practitioner with a number of difficult choices.[2] As our survey results demonstrate, the most nettlesome component of WACC estimation is the cost of equity capital; for unlike readily available yields in bond markets, no observable counterpart exists for equities. This forces practitioners to rely on more abstract and indirect methods to estimate the cost of equity capital.

II. Sample Selection

This paper describes the results of a telephone survey of leading practitioners. Believing that the complexity of the subject does not lend itself to a written questionnaire, we wanted to solicit an explanation of each firm's approach told in the practitioner's own words. Though our interviews were guided by a series of questions, these were sufficiently open-ended to

[2]Even at the theoretical level, Dixit and Pindyck (1994) point out that the use of standard net-present-value (NPV) decision rules (with, for instance, WACC as a discount rate) does not capture the option value of being able to delay an irreversible investment expenditure. As a result, a firm may find it better to delay an investment even if the current NPV is positive. Our survey does not explore the ways firms deal with this issue, rather, we focus on measuring capital costs.

reveal many subtle differences in practice.

Since our focus is on the gaps between theory and application rather than on average or typical practice, we aimed to sample practitioners who were leaders in the field. We began by searching for a sample of corporations (rather than investors or financial advisers) in the belief that they had ample motivation to compute WACC carefully and to resolve many of the estimation issues themselves. Several publications offer lists of firms that are well-regarded in finance;[3] of these, we chose a research report, *Creating World-Class Financial Management: Strategies of 50 Leading Companies* (1992), which identified firms

> selected by their peers as being among those with the best financial management. Firms were chosen for excellence in strategic financial risk management, tax and accounting, performance evaluation and other areas of financial management . . . The companies included were those that were mentioned the greatest number of times by their peers.[4]

From the 50 companies identified in this report, we eliminated 18 headquartered outside North America.[5] Of those remaining, five declined to be interviewed, leaving a sample of 27 firms. The companies included in the sample are contained in Exhibit 1. We approached the most senior financial officer first with a letter explaining our research, and then with a telephone call. Our request was to interview the individual in charge of estimating the firm's WACC. We promised our interviewees that, in preparing a report on our findings, we would not identify the practices of any particular company by name—we have respected this promise in our presentation.

In the interest of assessing the practices of the broader community of finance practitioners, we surveyed two other samples:

- **Financial Advisers.** Using a "league table" of merger and acquisition advisers presented in *Institutional Investor* issues of April 1995, 1994, and 1993, we drew a sample of 10 of the most active[6] advisers. We applied approximately[7] the same set of questions to representatives of these firms' mergers and acquisitions departments. We wondered whether the financial advisers' interest in promoting deals might lead them to lower WACC estimates than those estimated by operating companies. This proved not to be the case. If anything, the estimating techniques most often used by financial advisers yield higher, not lower, capital cost estimates.

- **Textbooks and Tradebooks.** From a leading textbook publisher, we obtained a list of the graduate-level textbooks in corporate finance having the greatest unit sales in 1994. From these, we selected the top four. In addition, we drew on three tradebooks that discuss the estimation of WACC in detail.

Names of advisers and books included in these two samples are shown in Exhibit 1.

III. Survey Findings

The detailed survey results appear in Exhibit 2. The estimation approaches are broadly similar across the three samples in several dimensions.

- Discounted Cash Flow (DCF) is the dominant investment-evaluation technique.
- WACC is the dominant discount rate used in DCF analyses.
- Weights are based on *market* not book value mixes of debt and equity.[8]
- The after-tax cost of debt is predominantly based on *marginal* pretax costs, and *marginal or statutory* tax rates.
- The CAPM is the dominant model for estimating the cost of equity. Some firms mentioned other multi-factor asset-pricing models (e.g., Arbitrage Pricing Theory) but these were in the small minority.

[3]For instance, *Institutional Investor* and *Euromoney* publish lists of firms with the best CFOs or with special competencies in certain areas. We elected not to use these lists because special competencies might not indicate a generally excellent finance department, nor might a stellar CFO.

[4]This survey was based upon a written questionnaire sent to CEOs, CFOs, controllers, and treasurers and was followed up by a telephone survey (Business International Corporation, 1992).

[5]Our reasons for excluding these firms were the increased difficulty of obtaining interviews, and possible difficulties in obtaining capital market information (such as betas and equity market premiums) that might preclude using American practices. The enlargement of this survey to firms from other countries is a subject worthy of future study.

[6]Activity in this case was defined as four-year aggregate deal volume in mergers and acquisitions. The sample was drawn from the top 12 advisers, using their *average* deal volume over the 1993-95 period. Of these 12, two firms chose not to participate in the survey.

[7]Specific questions differ, reflecting the facts that financial advisers infrequently deal with capital budgeting matters and that corporate financial officers infrequently value companies.

[8]The choice between target and actual proportions is not a simple one. Because debt and equity costs clearly depend on the proportions of each employed, it might appear that the actual proportions must be used. However, if the firm's target weights are publicly known, and if investors expect the firm soon to move to these weights, then observed costs of debt and equity may anticipate the target capital structure.

Exhibit 1. Three Survey Samples

Company Sample	Adviser Sample	Textbook/Tradebook Sample
Advanced Micro	CS First Boston	*Textbooks*
Allergan	Dillon, Read	Brealey and Myers
Black & Decker	Donaldson, Lufkin, Jenrette	Brigham and Gapenski
Cellular One	J.P. Morgan	Gitman
Chevron	Lehman Brothers	Ross, Westerfield, and Jaffe
Colgate-Palmolive	Merrill Lynch	*Tradebooks*
Comdisco	Morgan Stanley	Copeland, Koller, and Murrin
Compaq	Salomon Brothers	Ehrhardt
Eastman Kodak	Smith Barney	Ibbotson Associates
Gillette	Wasserstein Perella	
Guardian Industries		
Henkel		
Hewlett-Packard		
Kanthal		
Lawson Mardon		
McDonald's		
Merck		
Monsanto		
PepsiCo		
Quaker Oats		
Schering-Plough		
Tandem		
Union Carbide		
US West		
Walt Disney		
Weyerhauser		
Whirlpool		

No firms cited specific modifications of the CAPM to adjust for any empirical shortcomings of the model in explaining past returns.[9]

These practices differ sharply from those reported in earlier surveys.[10] First, the best-practice firms show much more alignment on most elements of practice. Second, they base their practice on financial economic models rather than on rules of thumb or arbitrary decision rules.

On the other hand, disagreements exist within and among groups on how to apply the CAPM to estimate cost of equity. The CAPM states that the required return (K) on any asset can be expressed as

$$K = R_f + \beta(R_m - R_f) \tag{2}$$

where:

R_f = interest rate available on a risk-free bond.

R_m = return required to attract investors to hold the broad market portfolio of risky assets.

β = the relative risk of the particular asset.

According to CAPM then, the cost of equity, K_{equity}, for a company depends on three components: returns on risk-free bonds (R_f), the stock's equity beta which measures risk of the company's stock relative to other risky assets (β = 1.0 is average risk), and the market risk premium ($R_m - R_f$) necessary to entice investors to hold risky assets generally versus risk-free bonds. In theory, each of these components must be a forward looking estimate. Our survey results show substantial disagreements on all three components.

A. The Risk-Free Rate of Return

As originally derived, the CAPM is a single-period model, so the question of which interest rate best represents the risk-free rate never arises. But in a many-period world typically characterized by upward-sloping yield curves, the practitioner must choose. Our results show the choice is typically between the 90-day Treasury bill yield and a long-term Treasury bond yield (see Exhibit 3). (Because the yield curve is ordinarily relatively flat beyond ten years, the choice of which particular long-term

[9]For instance, even research supporting the CAPM has found that empirical data are better explained by an intercept higher than a risk-free rate and a price of beta risk less than the market risk premium. Ibbotson Associates (1994) offers such a modified CAPM in addition to the standard CAPM and other models, in its cost of capital service. Jagannathan and McGrattan (1995) provide a useful review of empirical evidence on the CAPM.

[10]See Gitman and Forrester (1977) and Gitman and Mercurio (1982).

Exhibit 2. General Survey Results

	Corporations	Financial Advisers	Textbooks/Tradebooks
1. Do you use DCF techniques to evaluate investment opportunities?	89%—Yes, as a primary tool. 7%---Yes, only as secondary tool. 4%---No	100%—Rely on DCF, comparable companies multiples, comparable transactions multiples. Of these, 10%—DCF is a primary tool. 10%—DCF is used mainly as a check. 80%---Weight the three approaches depending on purpose and type of analysis.	100%—Yes
2. Do you use any form of a cost of capital as your discount rate in your DCF analysis?	89%—Yes 7%---Sometimes 4%—N/A	100%—Yes	100%---Yes
3. For your cost of capital, do you form any combination of capital cost to determine a WACC?	85%—Yes 4%---Sometimes 4%—No 7%—N/A	100%---Yes	100%---Yes
4. What weighting factors do you use? target vs. current debt/equity market vs. book weights	*Target/Current Market/Book* 52%—Target 59%---Market 15%---Current 15%—Book 26%—Uncertain 19%---Uncertain 7%--N/A 7%---N/A	*Target/Current Market/Book* 90%—Target 90%—Market 10%---Current 10%—Book	*Target/Current Market/Book* 86%—Target 100%—Market 14%—Current/Target
5. How do you estimate your before tax cost of debt?	52%—Marginal cost 37%—Current average 4%—Uncertain 7%—N/A	60%—Marginal cost 40%---Current average	71%—Marginal cost 29%—No explicit recommendation
6. What tax rate do you use?	52%—Marginal or statutory 37%—Historical average 4%—Uncertain 7%—N/A	60%---Marginal or statutory 30%---Historical average 10%—Uncertain	71%—Marginal or statutory 29%—No explicit recommendation
7. How do you estimate your cost of equity? (If you do not use CAPM, skip to question 12.)	81%—CAPM 4%—Modified CAPM 15%—N/A	80%---CAPM 20%—Other (including modified CAPM)	100%—Primarily CAPM Other methods mentioned: Dividend-Growth Model, Arbitrage-Pricing Model.
8. As usually written, the CAPM version of the cost of equity has three terms: a risk-free rate, a volatility or beta factor, and a market-risk premium. Is this consistent with your company's approach?	85%—Yes 0%—No 15%—N/A	90%—Yes 10%—N/A	100%—Yes
9. What do you use for the risk-free rate?	4%—90-day T-Bill 7%---three- to seven-year Treasuries 33%—ten-year Treasuries 4%---20-year Treasuries 33%—ten- to 30-year Treasuries 4%---ten-years or 90-Day; Depends 15%—N/A (Many said they match the term of the risk-free rate to the tenor of the investment.)	10%---90-day T-Bill 10%—five- to ten-year Treasuries 30%---ten- to 30-year Treasuries 40%—30-year Treasuries 10%---N/A	43%---T-Bills 29%—LT Treasuries 14%—Match tenor of investment 14%---Don't say

Exhibit 2. General Survey Results *(Continued)*

	Corporations	Financial Advisers	Textbooks/Tradebooks
10. What do you use as your volatility or beta factor?	52%—Published source 3%—Financial adviser's estimate 30%—Self calculated 15%—N/A	30%—Fundamental beta (e.g., BARRA) 40%—Published source 20%—Self calculated 10%—N/A	100%—Mention availability of published sources
11. What do you use as your market-risk premium?	11%—Use fixed rate of 4.0-4.5% 37%—Use fixed rate of 5.0-6.0% 4%—Use geometric mean 4%—Use arithmetic mean 4%—Use average of historical and implied 15%—Use financial adviser's estimate 7%—Use premium over treasuries 3%—Use Value Line estimate 15%—N/A	10%—Use fixed rate of 5.0% 50%—Use 7.0-7.4% (Similar to arithmetic) 10%—LT arithmetic mean 10%—Both LT arithmetic and geometric mean 10%—Spread above treasuries 10%—N/A	71%—Arithmetic historical mean 15%—Geometric historical mean 14%—Don't say
12. Having estimated your company's cost of capital, do you make any further adjustments to reflect the risk of individual investment opportunities?	26%—Yes 33%—Sometimes 41%—No	Not asked.	86%—Adjust beta for investment risk 14%—Don't say
13. How frequently do you re-estimate your company's cost of capital?	4%—Monthly 19%—Quarterly 11%—Semi-Annually 37%—Annually 7%—Continually/Every Investment 19%—Infrequently 4%—N/A (Generally, many said that in addition to scheduled reviews, they re-estimate as needed for significant events such as acquisitions and high-impact economic events.)	Not asked.	100%—No explicit recommendation
14. Is the cost of capital used for purposes other than project analysis in your company? (For example, to evaluate divisional performance?)	51%—Yes 44%—No 4%—N/A	Not asked.	100%—No explicit discussion
15. Do you distinguish between strategic and operational investments? Is cost of capital used differently in these two categories?	48%—Yes 48%—No 4%—N/A	Not asked.	29%—Yes 71%—No explicit discussion
16. What methods do you use to estimate terminal value? Do you use the same discount rate for the terminal value as for the interim cash flows?	Not asked.	30%—Exit multiples only 70%—Both multiples and perpetuity DCF model 70%—Use same WACC for TV 20%—No response 10%—Rarely change	71%—Perpetuity DCF model 29%—No explicit discussion 100%—No explicit discussion of separate WACC for terminal value

Exhibit 2. General Survey Results *(Continued)*

	Corporations	Financial Advisers	Textbooks/Tradebooks
17. In valuing a multidivisional company, do you aggregate the values of the individual divisions, or just value the firm as a whole? If you value each division separately, do you use a different cost of capital for each one?	Not asked.	100%—Value the parts 100%—Use different WACCs for separate valuations	100%—Use distinct WACC for each division
18. In your valuations do you use any different methods to value synergies or strategic opportunities (e.g., higher or lower discount rates, options valuation)?	Not asked.	30%—Yes 50%—No 20%—Rarely	29%—Use distinct WACC for synergies 71%—No explicit discussion
19. Do you make any adjustments to the risk premium for changes in market conditions?	Not asked.	20%—Yes 70%—No 10%—N/A	14%—Yes 86%—No explicit discussion
20. How long have you been with the company? What is your job title?	10 years—Mean All senior, except one	7.3 years—Mean 4—MDs, 2—VPs, 4—Associates	N/A

yield to use is not a critical one.)[11] The difference between realized returns on the 90-day T-bill and the ten-year T-bond has averaged 150 basis points over the long-run: so choice of a risk-free rate can have a material effect on the cost of equity and WACC.[12]

The 90-day T-bill yields are more consistent with the CAPM as originally derived and reflect truly risk-free returns in the sense that T-bill investors avoid material loss in value from interest rate movements. However, long-term bond yields more closely reflect the default-free holding period returns available on long lived investments and thus more closely mirror the types of investments made by companies.

Our survey results reveal a strong preference on the part of practitioners for long-term bond yields. Of both corporations and financial advisers, 70% use Treasury bond yields maturities of ten years or greater. None of the financial advisers and only 4% of the corporations used the Treasury bill yield. Many corporations said they matched the term of the risk-free rate to the tenor of the investment. In contrast, 43% of the books advocated the T-bill yield, while only 29% used long-term Treasury yields.

B. Beta Estimates

Finance theory calls for a forward-looking beta, one reflecting investors' uncertainty about the future cash flows to equity. Because forward-looking betas are unobservable, practitioners are forced to rely on proxies of various kinds. Most often this involves using beta estimates derived from historical data and published by such sources as Bloomberg, Value Line, and Standard & Poor's.

The usual methodology is to estimate beta as the slope coefficient of the market model of returns.

$$R_{it} = \alpha_i + \beta_i(R_{mt}) \tag{3}$$

where

R_{it} = return on stock i in time period (e.g., day, week, month) t,

[11]In early January 1995, the differences between yields on the ten- and 30-year T-bonds were about 35 basis points. Some aficionados will argue that there *is* a difference between the ten- and 30-year yields. Ordinarily the yield curve declines just slightly as it reaches the 30-year maturity—this has been explained to us as the result of life insurance companies and other long-term buy-and-hold investors who are said to purchase the long bond in significant volume. It is said that these investors command a lower liquidity premium than the broader market, thus driving down yields. If this is true, then the yields at this point of the curve may be due not to some ordinary process of rational expectations, but rather to an anomalous supply-demand imbalance, which would render these yields less trustworthy. The counterargument is that life insurance companies could be presumed to be rational investors too. As buy-and-hold investors, they will surely suffer the consequences of any irrationality, and therefore have good motive to invest for yields "at the market."

[12]This was estimated as the difference in arithmetic mean returns on long-term government bonds and US Treasury bills over the years 1926 to 1994, given by Ibbotson Associates (1995).

Exhibit 3. Choice of Bond Market Proxy

Some of our best-practice companies noted that their choice of a bond market proxy for a risk-free rate depended specifically on how they were proposing to spend funds. We asked, "What do you use for a risk-free rate?" and heard the following:

- "Ten-year Treasury bond or other duration Treasury bond if needed to better match project horizon."
- "We use a three- to five-year Treasury note yield, which is the typical length of our company's investment. We match our average investment horizon with maturity of debt."

R_{mt} = return on the market portfolio in period t,
α_i = regression constant for stock i, and
β_i = beta for stock i.

In addition to relying on historical data, use of this equation to estimate beta requires a number of practical compromises, each of which can materially affect the results. For instance, increasing the number of time periods used in the estimation may improve the statistical reliability of the estimate but risks the inclusion of stale, irrelevant information. Similarly, shortening the observation period from monthly to weekly, or even daily, increases the size of the sample but may yield observations that are not normally distributed and may introduce unwanted random noise. A third compromise involves choice of the market index. Theory dictates that R_m is the return on the market portfolio, an unobservable portfolio consisting of *all* risky assets, including human capital and other nontraded assets, in proportion to their importance in world wealth. Beta providers use a variety of stock market indices as proxies for the market portfolio on the argument that stock markets trade claims on a sufficiently wide array of assets to be adequate surrogates for the unobservable market portfolio.

Exhibit 4 shows the compromises underlying the beta estimates of three prominent providers and their combined effect on the beta estimates of our sample companies. Note for example that the mean beta of our sample companies according to Bloomberg is 1.03, while the same number according to Value Line is 1.24. Exhibit 5 provides a complete list of sample betas by publisher.

Over half of the corporations in our sample (item ten, Exhibit 2) rely on published sources for their beta estimates, although 30% calculate their own. Among financial advisers, 40% rely on published sources, 20% calculate their own, and another 40% use what might be called "fundamental" beta estimates. These are estimates which use multi-factor statistical models drawing on fundamental indices of firm and industry

Exhibit 4. Compromises Underlying Beta Estimates and Their Effect on Estimated Betas of Sample Companies

	Bloomberg[a]	Value Line	Standard & Poor's
Number	102	260	60
Time Interval	wkly (2 yrs.)	wkly (5 yrs.)	mthly(5 yrs.)
Market Index Proxy	S&P 500	NYSE composite	S&P 500
Mean Beta	1.03	1.24	1.18
Median Beta	1.00	1.20	1.21

[a]With the Bloomberg service, it is possible to estimate a beta over many differing time periods, market indices, and as smoothed or unadjusted. The figures presented here represent the base-line or default-estimation approach used if other approaches are not specified.

risk to estimate company betas. The best known provider of fundamental beta estimates is the consulting firm BARRA.

Within these broad categories, a number of survey participants indicated use of more pragmatic approaches, which combine published beta estimates or adjust published estimates in various heuristic ways. (See Exhibit 6.)

C. Equity Market Risk Premium

This topic prompted the greatest variety of responses among survey participants. Finance theory says the equity market risk premium should equal the excess return expected by investors on the market portfolio relative to riskless assets. How one measures expected future returns on the market portfolio and on riskless assets are problems left to practitioners. Because expected future returns are unobservable, all survey respondents extrapolated historical returns into the future on the presumption that past experience heavily conditions future expectations. Where respondents chiefly differed was in their use of *arithmetic* versus *geometric* average historical equity returns and in their choice of realized returns on T-bills versus T-bonds to proxy for the return on riskless assets.

The arithmetic mean return is the simple average of past returns. Assuming the distribution of returns is stable over time and that periodic returns are independent of one another, the arithmetic return is the best estimator of expected return.[13] The geometric mean return is the internal rate of return between a single outlay and one or more future receipts. It

[13]Several studies have documented significant negative autocorrelation in returns—this violates one of the essential tenets of the arithmetic calculation since, if returns are not serially independent, the simple arithmetic mean of a distribution will not be its expected value. The autocorrelation findings are reported by Fama and French (1986), Lo and MacKinlay (1988), and Poterba and Summers (1988).

Exhibit 5. Betas for Corporate Survey Respondents

In this exhibit, Bloomberg's adjusted beta is $\beta_{adj} = (0.66)\beta_{raw} + (0.33)1.00$ and Value Line reported only Total Debt/Total Cap for these firms, except in the case of US West, in which LT Debt/Total Cap was reported.

	Bloomberg Betas				Range
	Raw	Adjusted	Value Line Betas	S&P Betas	Max. - Min.
Advanced Micro	1.20	1.13	1.70	1.47	0.57
Allergan	0.94	0.96	1.30	1.36	0.42
Black & Decker	1.06	1.04	1.65	1.78	0.74
Cellular One			Not Listed		
Chevron	0.70	0.80	0.70	0.68	0.12
Colgate-Palmolive	1.11	1.07	1.20	0.87	0.33
Comdisco	1.50	1.34	1.35	1.20	0.30
Compaq	1.26	1.18	1.50	1.55	0.37
Eastman Kodak	0.54	0.69	NMF	0.37	0.32
Gillette	0.93	0.95	1.25	1.30	0.37
Guardian Industries			Not Listed		
Henkel			Not Listed		
Hewlett-Packard	1.34	1.22	1.40	1.96	0.74
Kanthal			Not Listed		
Lawson Mardon			Not Listed		
McDonald's	0.93	0.96	1.05	1.09	0.16
Merck	0.73	0.82	1.10	1.15	0.42
Monsanto	0.89	0.93	1.10	1.36	0.47
PepsiCo	1.12	1.08	1.10	1.19	0.11
Quaker Oats	1.38	1.26	0.90	0.67	0.71
Schering-Plough	0.51	0.67	1.00	0.82	0.49
Tandem	1.35	1.23	1.75	1.59	0.52
Union Carbide	1.51	1.34	1.30	0.94	0.57
US West	0.61	0.74	0.75	0.53	0.22
Walt Disney	1.42	1.28	1.15	1.22	0.27
Weyerhauser	0.78	0.85	1.20	1.21	0.43
Whirlpool	0.90	0.93	1.55	1.58	0.68
Mean	1.03	1.02	1.24	1.18	0.42
Median	1.00	1.00	1.20	1.21	0.42
Standard Deviation	0.31	0.21	0.29	0.41	0.19

measures the compound rate of return investors earned over past periods. It accurately portrays historical investment experience. Unless returns are the same each time period, the geometric average will always be less than the arithmetic average, and the gap widens as returns become more volatile.[14]

[14]For large samples of returns, the geometric average can be approximated as the arithmetic average minus one half the variance of realized returns. Ignoring sample size adjustments, the variance of returns in the current example is 0.09 yielding an estimate of 0.10 - ½(0.09) = 0.055 = 5.5% versus the actual 5.8% figure. Kritzman (1994) provides an interesting comparison of the two types of averages.

Based on Ibbotson Associates' data (1995) from 1926 to 1995, Exhibit 7 illustrates the possible range of equity market risk premiums depending on use of the geometric as opposed to the arithmetic mean equity return and on use of realized returns on T-bills as opposed to T-bonds.[15] Even wider variations in market risk premiums can arise when one changes the historical period for averaging. Extending US stock experience

[15]These figures are drawn from Table 2-1, Ibbotson Associates (1995), where the R_m was drawn from the "Large Company Stocks" series, and R_f drawn from the "Long-Term Government Bonds" and "US Treasury Bills" series.

Exhibit 6. Beta Factor

We asked our sample companies, "What do you use as your volatility or beta factor?" A sampling of responses shows the choice is not always a simple one.

- "We use adjusted betas reported by Bloomberg. At times, our stock has been extremely volatile. If at a particular time the factor is considered unreasonably high, we are apt to use a lower (more consistent) one."
- "We begin with the observed 60-month covariance between our stock and the market. We also consider, Value Line, Barra, S&P betas for comparison and may adjust the observed beta to match assessment of future risk."
- "We average Merrill Lynch and Value Line figures and use Bloomberg as a check."
- "We do not use betas estimated on our stock directly. Our company beta is built up as a weighted average of our business segment betas—the segment betas are estimated using pure-play firm betas of comparable companies."

Exhibit 7. The Equity Market Risk Premium (R_m - R_f)

	T-Bill Returns	T-Bond Returns
Arithmetic Mean Return	8.5%	7.0%
Geometric Mean Return	6.5%	5.4%

back to 1802, Siegel (1992) shows that historical market premia have changed over time and were typically lower in the pre-1926 period. Carleton and Lakonishok (1985) illustrate considerable variation in historical premia using different time periods and methods of calculation even with data since 1926.

Of the texts and tradebooks in our survey, 71% support use of the arithmetic mean return over T-bills as the best surrogate for the equity market risk premium. For long-term projects, Ehrhardt (1994) advocates forecasting the T-bill rate and using a different cost of equity for each future time period. Kaplan and Ruback (1995) studied the equity risk premium implied by the valuations in highly leveraged transactions and estimated a mean premium of 7.97%, which is most consistent with the arithmetic mean and T-bills. A minority view is that of Copeland, Koller, and Murrin (1990), "We believe that the geometric average represents a better estimate of investors' expected over long periods of time." Ehrhardt (1994) recommends use of the geometric mean return if one believes stockholders are buy-and-hold investors.

Half of the financial advisers queried use a premium consistent with the arithmetic mean and T-bill returns, and many specifically mentioned use of the arithmetic mean. Corporate respondents, on the other hand, evidenced more diversity of opinion and tend to favor a lower market premium: 37% use a premium of 5-6%, and another 11% use an even lower figure.

Comments in our interviews (see Exhibit 8) suggest the diversity among survey participants. While most of our 27 sample companies appear to use a 60+-year historical period to estimate returns, one cited a window of less than ten years, two cited windows of about ten years, one began averaging with 1960, and another with 1952 data.

This variety of practice should not come as a surprise since theory calls for a forward-looking risk premium, one that reflects current market sentiment and may change with market conditions. What is clear is that there is substantial variation as practitioners try to operationalize the theoretical call for a market risk premium. A glaring result is that few respondents specifically cited use of any forward-looking method to supplement or replace reading the tea leaves of past returns.[16]

IV. The Impact of Various Assumptions for Using CAPM

To illustrate the effect of these various practices, we estimated the hypothetical cost of equity and WACC for Black & Decker, which we identified as having a wide range in estimated betas, and for McDonald's, which has a relatively narrow range. Our estimates are "hypothetical" in that we do not adopt any information supplied to us by the companies but rather apply a range of approaches based on publicly available information as of late 1995. Exhibit 9 gives Black & Decker's estimated costs of equity and WACCs under various combinations of risk-free rate, beta, and market risk premia. Three clusters of practice are illustrated, each in turn using three betas as provided by S & P, Value Line, and Bloomberg (unadjusted). The first approach, as suggested by some texts, marries a short-term risk-free rate (90-day T-bill yield) with Ibbotson's arithmetic mean (using T-bills) risk

[16]Only two respondents (one adviser and one company) specifically cited forward-looking estimates although others cited use of data from outside sources (e.g., a company using an estimate from an investment bank) where we cannot identify whether forward-looking estimates were used. Some studies using financial analyst forecasts in dividend growth models suggest market risk premia average in the 6 to 6.5% range and change over time with higher premia when interest rates decline. See for instance, Harris and Marston (1992). Ibbotson Associates (1994) provides industry-specific cost-of-equity estimates using analysts' forecasts in a growth model.

Exhibit 8. Market Risk Premium

"What do you use as your market risk premium?" A sampling of responses from our best-practice companies shows the choice can be a complicated one.

- "Our 400 basis point market premium is based on the historical relationship of returns on an actualized basis and/or investment bankers' estimated cost of equity based on analysts' earnings projections."
- "We use an Ibbotson arithmetic average starting in 1960. We have talked to investment banks and consulting firms with advice from 3-7%."
- "A 60-year average of about 5.7%. This number has been used for a long time in the company and is currently the subject of some debate and is under review. We may consider using a time horizon of less than 60 years to estimate this premium."
- "We are currently using 6%. In 1993, we polled various investment banks and academic studies on the issue as to the appropriate rate and got anywhere between 2 and 8%, but most were between 6 and 7.4%."

Comments from financial advisers also were revealing. While some simply responded that they use a published historical average, others presented a more complex picture.

- "We employ a self-estimated 5% (arithmetic average). A variety of techniques are used in estimation. We look at Ibbotson data and focus on more recent periods, around 30 years (but it is not a straight 30-year average). We use smoothing techniques, Monte Carlo simulation and a dividend discount model on the S&P 400 to estimate what the premium should be, given our risk-free rate of return."
- "We use a 7.4% arithmetic mean, after Ibbotson, Sinquefeld. We used to use the geometric mean following the then scholarly advice, but we changed to the arithmetic mean when we found later that our competitors were using the arithmetic mean and scholars' views were shifting."

premium. The second, adopted by a number of financial advisers, uses a long-term risk-free rate (30-year T-bond yield) and a risk premium of 7.2% (the modal premium mentioned by financial advisers). The third approach also uses a long-term risk-free rate but adopts the modal premium mentioned by corporate respondents of 5.5%. We repeated these general procedures for McDonald's.

The resulting ranges of estimated WACCs for the two firms are:

	Maximum WACC	Minimum WACC	Difference in Basis Points
Black & Decker	12.80%	8.50%	430
McDonald's	11.60%	9.30%	230

The range from minimum to maximum is large for both firms, and the economic impact is potentially stunning. To illustrate this, the present value of a level perpetual annual stream of $10 million would range between $78 million and $118 million for Black and Decker, and between $86 million and $108 million for McDonald's.

Given the positive but relatively flat slope of the yield curve in late 1995, most of the variation in our illustration is explained by beta and the equity market premium assumption. Variations can be even more dramatic, especially when the yield curve is inverted.

V. Risk Adjustments to WACC

Finance theory is clear that a single WACC is appropriate only for investments of broadly comparable risk: a firm's overall WACC is a suitable benchmark for a firm's average risk investments. Finance theory goes on to say that such a company-specific figure should be adjusted for departures from such an average risk profile. Attracting capital requires payment of a premium that depends on risk.

We probed whether firms use a discount rate appropriate to the risks of the flows being valued in questions on types of investment (strategic vs. operational), terminal values, synergies, and multidivisional companies. Responses to these questions displayed in Exhibit 2 do not display much apparent alignment of practice. When financial advisers were asked how they value parts of multidivision firms, all ten firms surveyed reported that they use different discount rates for component parts (item 17). However, only 26% of companies always adjust the cost of capital to reflect the risk of individual investment opportunities (item 12). Earlier studies (summarized in Gitman and Mercurio, 1982) reported that between one-third and one-half of the firms surveyed did *not* adjust for risk differences among capital projects. These practices stand in stark contrast

Exhibit 9. Variations in Cost of Capital (WACC) Estimates for Black and Decker Using Different Methods of Implementing the Capital-Asset Pricing Model

In this Exhibit, in all cases the CAPM is used to estimate the cost of equity, the cost of debt is assumed to be 7.81% based on a Baa rating, the tax rate is assumed to be 38%, and debt is assumed to represent 49% of capital.

Panel A. Short-Term Rate Plus Arithmetic Average Historical Risk Premium

(recommended by some texts)
R_f = 5.36%, 90-day T-bills
$R_m - R_f$ = 8.50%, Ibbotson arithmetic average since 1926

	Cost of Equity	Cost of Capital
Beta Service	K_e	WACC
Bloomberg, β = 1.06	14.40%	9.70%
Value Line, β = 1.65	19.40%	12.20%
S&P, β = 1.78	20.25%	12.80%

Panel B. Long-Term Rate Plus Risk Premium of 7.20%

(modal practice of financial advisers surveyed)
R_f = 6.26%, 30-year T-bonds
$R_m - R_f$ = 7.20%, modal response of financial advisers

	Cost of Equity	Cost of Capital
Beta Service	K_e	WACC
Bloomberg, β = 1.06	13.90%	9.40%
Value Line, β = 1.65	18.10%	11.60%
S&P, β = 1.78	19.10%	12.10%

Panel C. Long-Term Rate Plus Risk Premium of 5.50%

(modal practice of corporations surveyed)
R_f = 6.26%, 30-year T-bonds
$R_m - R_f$ = 5.50%, modal response of corporations

	Cost of Equity	Cost of Capital
Beta Service	K_e	WACC
Bloomberg, β = 1.06	12.10%	8.50%
Value Line, β = 1.65	15.30%	10.20%
S&P, β = 1.78	16.10%	10.50%

to the recommendations of textbooks and tradebooks: the books did not explicitly address all subjects, but when they did, they were uniform in their advocacy of risk-adjusted discount rates.

A closer look at specific responses reveals the tensions as theory based on traded financial assets is adapted to decisions on investments in real assets. Inevitably, a fine line is drawn between use of financial market data versus managerial judgments. Responses from financial advisers illustrate this. As shown in Exhibit 2, all advisers use different capital costs for valuing parts (e.g., divisions) of a firm (item 17); only half ever select different rates for synergies or strategic opportunities (item 18); only one in ten state any inclination to use different discount rates for terminal values and interim cash flows (item 16). Two simplistic interpretations are that 1) advisers ignore important risk differences, or 2) material risk differences are rare in assessing factors such as terminal values. Neither of these fit; our conversations with advisers reveal that they recognize important risk differences but deal with them in a multitude of ways. Consider comments from two prominent investment banks who use different capital costs for valuing parts of multidivision firms. When asked about risk adjustments for prospective merger synergies, these same firms responded:

- "We make these adjustments in cash flows and multiples rather than in discount rates."
- "Risk factors may be different for realizations of synergies, but we make adjustments to cash flows rather than the discount rate."

While financial advisers typically value existing companies, corporations face further challenges. They routinely must evaluate investments in new products and technologies. Moreover, they deal in an administrative setting that melds centralized (e.g., calculating a WACC) and decentralized (e.g., specific project appraisal) processes. As Exhibit 10 illustrates, these complexities lead to a blend of approaches for dealing with risk. A number of respondents mentioned specific rate adjustments to distinguish between divisional capital costs, international versus domestic investments and leasing versus nonleasing situations.

Exhibit 10. Adjustments for Project Risk

When asked whether they adjusted discount rates for project risk, companies provided a wide range of responses.

- "No, it's difficult to draw lines between the various businesses we invest in and we also try as best we can to make adjustments for risk in cash flow projections rather than in cost of capital factors...We advocate minimizing adjustments to cost of capital calculations and maximizing understanding of all relevant issues, e.g., commodity costs and international/political risks." At another point the same firm noted that "for lease analysis only the cost of debt is used."
- "No (we don't risk adjust cost of capital). We believe there are two basic components: 1) projected cash flows, which should incorporate investment risk, and 2) discount rate." The same firm noted, however: "For international investments, the discount rate is adjusted for country risk." and "For large acquisitions, the company takes significantly greater care to estimate an accurate cost of capital."
- "No, but use divisional costs of capital to calculate a weighted average company cost of capital . . . for comparison and possible adjustment."
- "Yes, we have calculated a cost of capital for divisions based on pure play betas and also suggest subjective adjustments based on each project. Our feeling is that use of divisional costs is the most frequent distinction in the company."
- "Rarely, but at least on one occasion we have for a whole new line of business."
- "We do sensitivity analysis on every project."
- "For the most part we make risk adjustments qualitatively i.e., we use the corporate WACC to evaluate a project, but then interpret the result according to the risk of the proposal being studied. This could mean that a risky project will be rejected even though it meets the corporate hurdle rate objectives."
- "No domestically; yes internationally—we assess a risk premium per country and adjust the cost of capital accordingly."

In other instances, however, these same respondents favored cash flow adjustments to deal with risks.

Why do practitioners risk adjust discount rates in one case and work with cash flow adjustments in another? Our interpretation is that risk-adjusted discount rates are more likely used when the analyst can establish relatively objective financial market benchmarks for what rate adjustments should be. At the business (division) level, data on comparable companies provide cost-of-capital estimates. Debt markets provide surrogates for the risks in leasing cash flows. International financial markets shed insights on cross-country differences. When no such market benchmarks are available, practitioners look to other methods for dealing with risks. Lacking a good market analog from which to glean investor opinion (in the form of differing capital costs), the analyst is forced to rely more on internal focus. Practical implementation of risk-adjusted discount rates thus appears to depend on the ability to find traded financial assets that are comparable in risk to the cash flows being valued and then to have financial data on these traded assets.

The pragmatic bent of application also comes to the fore when companies are asked how often they reestimate capital costs (item 13, Exhibit 2). Even for those firms who reestimate relatively frequently, Exhibit 11 shows that they draw an important distinction between estimating capital costs and policy changes about the capital cost figure used in the firm's decision making. Firms consider administrative costs in structuring their policies on capital costs. For a very large venture (e.g. an acquisition), capital costs may be revisited each time. On the other hand, only large material changes in costs may be fed into more formal project evaluation systems. Firms also recognize a certain ambiguity in any cost number and are willing to live with approximations. While the bond market reacts to minute basis point changes in investor return requirements, investments in real assets, where the decision process itself is time consuming and often decentralized, involve much less precision. To paraphrase one of our sample companies, we use capital costs as a rough yardstick rather than the last word in project evaluation.

Our interpretation is that the mixed responses to questions about risk adjusting and reestimating discount rates reflect an often sophisticated set of practical tradeoffs: these involve the size of risk differences, the quality of information from financial markets, and the realities of administrative costs and processes. In cases where there are material

Exhibit 11. Cost-of-Capital Estimates

How frequently do you re-estimate your company's cost of capital? Here are responses from best-practice companies.

- "We usually review it quarterly but would review more frequently if market rates changed enough to warrant the review. We would only announce a change in the rate if the recomputed number was materially different than the one currently being used."
- "We reestimate it once or twice a year, but we rarely change the number that the business units use for decision and planning purposes. We expect the actual rate to vary over time, but we also expect that average to be fairly constant over the business cycle. Thus, we tend to maintain a steady discount rate within the company over time."
- "Usually every six months, except in cases of very large investments, in which it is reestimated for each analysis."
- "Whenever we need to, such as for an acquisition or big investment proposal."
- "Re-evaluate as needed e.g., for major tax changes, but unless the cost of capital change is significant (a jump to 21%, for instance), our cutoff rate is not changed; it is used as a *yardstick* rather than the last word in project evaluation."
- "Probably need 100 basis point change to publish a change. We report only to the nearest percent."

differences in perceived risk, a sufficient scale of investment to justify the effort, no large scale administrative complexities, and readily identifiable information from financial markets, practitioners employ risk adjustments to rates quite routinely. Acquisitions, valuing divisions of companies, analysis of foreign versus domestic investments, and leasing versus nonleasing decisions were frequently cited examples. In contrast, when one or more of these factors is not present, practitioners are more likely to employ other means to deal with risks.

VI. Conclusions

Our research sought to identify the "best practice" in cost-of-capital estimation through interviews of leading corporations and financial advisers. Given the huge annual expenditure on capital projects and corporate acquisitions each year, the wise selection of discount rates is of material importance to senior corporate managers.

The survey revealed broad acceptance of the WACC as the basis for setting discount rates. In addition, the survey revealed general alignment in many aspects of the estimation of WACC. The main area of notable disagreement was in the details of implementing CAPM to estimate the cost of equity. This paper outlined the varieties of practice in CAPM use, the arguments in favor of different approaches, and the practical implications.

In summary, we believe that the following elements represent best current practice in the estimation of WACC:

- Weights should be based on *market-value* mixes of debt and equity.
- The after-tax cost of debt should be estimated from *marginal* pretax costs, combined with *marginal or statutory* tax rates.
- CAPM is currently the preferred model for estimating the cost of equity.
- Betas are drawn substantially from published sources, preferring those betas using a long interval of equity returns. Where a number of statistical publishers disagree, best practice often involves judgment to estimate a beta.
- Risk-free rate should match the tenor of the cash flows being valued. For most capital projects and corporate acquisitions, the yield on the US government Treasury bond of ten or more years in maturity would be appropriate.
- Choice of an equity market risk premium is the subject of considerable controversy both as to its value and method of estimation. Most of our best-practice companies use a premium of 6% or lower while many texts and financial advisers use higher figures.
- Monitoring for changes in WACC should be keyed to major changes in financial market conditions, but should be done at least annually. Actually flowing a change through a corporate system of project valuation and compensation targets must be done gingerly and only when

there are material changes.

- WACC should be risk adjusted to reflect substantive differences among different businesses in a corporation. For instance, financial advisers generally find the corporate WACC to be inappropriate for valuing different parts of a corporation. Given publicly traded companies in different businesses, such risk adjustment involves only modest revision in the WACC and CAPM approaches already used. Corporations also cite the need to adjust capital costs across national boundaries. In situations where market proxies for a particular type of risk class are not available, best practice involves finding other means to account for risk differences.

Best practice is largely consistent with finance theory. Despite broad agreement at the theoretical level, however, several problems in application remain that can lead to wide divergence in estimated capital costs. Based on these remaining problems, we believe that further applied research on two principal topics is warranted. First, practitioners need additional tools for sharpening their assessment of relative risk. The variation in company-specific beta estimates from different published sources can create large differences in capital-cost estimates. Moreover, use of risk-adjusted discount rates appears limited by lack of good market proxies for different risk profiles. We believe that appropriate use of averages across industry or other risk categories is an avenue worth exploration. Second, practitioners could benefit from further research on estimating equity market risk premia. Current practice displays large variations and focuses primarily on averaging past data. Use of expectational data appears to be a fruitful approach. As the next generation of theories gradually sharpen our insights, we feel that research attention to implementation of existing theory can make for real improvements in practice.

Finally our research is a reminder of the old saying that too often in business we measure with a micrometer, mark with a pencil, and cut with an ax. Despite the many advances in finance theory, the particular "ax" available for estimating company capital costs remains a blunt one. Best-practice companies can expect to estimate their weighted average cost of capital with an accuracy of no more than plus or minus 100 to 150 basis points. This has important implications for how managers use the cost of capital in decision making. First, do not mistake capital budgeting for bond pricing. Despite the tools available, effective capital appraisal continues to require thorough knowledge of the business and wise business judgment. Second, be careful not to throw out the baby with the bath water. Do not reject the cost of capital and attendant advances in financial management because your finance people are not able to give you a precise number. When in need, even a blunt ax is better than nothing. ■

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NEW REGULATORY FINANCE

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The model is analogous to the standard CAPM, but with the return on a minimum risk portfolio that is unrelated to market returns, R_Z, replacing the risk-free rate, R_F. The model has been empirically tested by Black, Jensen, and Scholes (1972), who find a flatter than predicted SML, consistent with the model and other researchers' findings. An updated version of the Black-Jensen-Scholes study is available in Brealey, Myers, and Allen (2006) and reaches similar conclusions.

The zero-beta CAPM cannot be literally employed to estimate the cost of capital, since the zero-beta portfolio is a statistical construct difficult to replicate. Attempts to estimate the model are formally equivalent to estimating the constants, a and b, in Equation 6-2. A practical alternative is to employ the Empirical CAPM, to which we now turn.

6.3 Empirical CAPM

As discussed in the previous section, several finance scholars have developed refined and expanded versions of the standard CAPM by relaxing the constraints imposed on the CAPM, such as dividend yield, size, and skewness effects. These enhanced CAPMs typically produce a risk-return relationship that is flatter than the CAPM prediction in keeping with the actual observed risk-return relationship. The ECAPM makes use of these empirical findings. The ECAPM estimates the cost of capital with the equation:

$$K = R_F + \acute{\alpha} + \beta \times (MRP - \acute{\alpha}) \qquad (6\text{-}5)$$

where $\acute{\alpha}$ is the "alpha" of the risk-return line, a constant, and the other symbols are defined as before. All the potential vagaries of the CAPM are telescoped into the constant $\acute{\alpha}$, which must be estimated econometrically from market data. Table 6-2 summarizes[10] the empirical evidence on the magnitude of alpha.[11]

[10] The technique is formally applied by Litzenberger, Ramaswamy, and Sosin (1980) to public utilities in order to rectify the CAPM's basic shortcomings. Not only do they summarize the criticisms of the CAPM insofar as they affect public utilities, but they also describe the econometric intricacies involved and the methods of circumventing the statistical problems. Essentially, the average monthly returns over a lengthy time period on a large cross-section of securities grouped into portfolios are related to their corresponding betas by statistical regression techniques; that is, Equation 6-5 is estimated from market data. The utility's beta value is substituted into the equation to produce the cost of equity figure. Their own results demonstrate how the standard CAPM underestimates the cost of equity capital of public utilities because of utilities' high dividend yield and return skewness.

[11] Adapted from Vilbert (2004).

TABLE 6-2
EMPIRICAL EVIDENCE ON THE ALPHA FACTOR

Author	Range of alpha
Fischer (1993)	−3.6% to 3.6%
Fischer, Jensen and Scholes (1972)	−9.61% to 12.24%
Fama and McBeth (1972)	4.08% to 9.36%
Fama and French (1992)	10.08% to 13.56%
Litzenberger and Ramaswamy (1979)	5.32% to 8.17%
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 5.04%
Pettengill, Sundaram and Mathur (1995)	4.6%
Morin (1989)	2.0%

For an alpha in the range of 1%–2% and for reasonable values of the market risk premium and the risk-free rate, Equation 6-5 reduces to the following more pragmatic form:

$$K = R_F + 0.25\,(R_M - R_F) + 0.75\,\beta(R_M - R_F) \qquad (6\text{-}6)$$

Over reasonable values of the risk-free rate and the market risk premium, Equation 6-6 produces results that are indistinguishable from the ECAPM of Equation 6-5.[12]

An alpha range of 1%–2% is somewhat lower than that estimated empirically. The use of a lower value for alpha leads to a lower estimate of the cost of capital for low-beta stocks such as regulated utilities. This is because the use of a long-term risk-free rate rather than a short-term risk-free rate already incorporates some of the desired effect of using the ECAPM. That is, the

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[12] Typical of the empirical evidence on the validity of the CAPM is a study by Morin (1989) who found that the relationship between the expected return on a security and beta over the period 1926–1984 was given by:

$$\text{Return} = 0.0829 + 0.0520\,\beta$$

Given that the risk-free rate over the estimation period was approximately 6% and that the market risk premium was 8% during the period of study, the intercept of the observed relationship between return and beta exceeds the risk-free rate by about 2%, or 1/4 of 8%, and that the slope of the relationship is close to 3/4 of 8%. Therefore, the empirical evidence suggests that the expected return on a security is related to its risk by the following approximation:

$$K = R_F + x(R_M - R_F) + (1 - x)\beta(R_M - R_F)$$

where x is a fraction to be determined empirically. The value of x that best explains the observed relationship Return $= 0.0829 + 0.0520\,\beta$ is between 0.25 and 0.30. If x = 0.25, the equation becomes:

$$K = R_F + 0.25(R_M - R_F) + 0.75\beta(R_M - R_F)$$

long-term risk-free rate version of the CAPM has a higher intercept and a flatter slope than the short-term risk-free version which has been tested. Thus, it is reasonable to apply a conservative alpha adjustment. Moreover, the lowering of the tax burden on capital gains and dividend income enacted in 2002 may have decreased the required return for taxable investors, steepening the slope of the ECAPM risk-return trade-off and bring it closer to the CAPM predicted returns.[13]

To illustrate the application of the ECAPM, assume a risk-free rate of 5%, a market risk premium of 7%, and a beta of 0.80. The Empirical CAPM equation (6-6) above yields a cost of equity estimate of 11.0% as follows:

$$\begin{aligned} K &= 5\% + 0.25\,(12\% - 5\%) + 0.75 \times 0.80\,(12\% - 5\%) \\ &= 5.0\% + 1.8\% + 4.2\% \\ &= 11.0\% \end{aligned}$$

As an alternative to specifying alpha, see Example 6-1.

Some have argued that the use of the ECAPM is inconsistent with the use of adjusted betas, such as those supplied by Value Line and Bloomberg. This is because the reason for using the ECAPM is to allow for the tendency of betas to regress toward the mean value of 1.00 over time, and, since Value Line betas are already adjusted for such trend, an ECAPM analysis results in double-counting. This argument is erroneous. Fundamentally, the ECAPM is not an adjustment, increase or decrease, in beta. This is obvious from the fact that the expected return on high beta securities is actually lower than that produced by the CAPM estimate. The ECAPM is a formal recognition that the observed risk-return tradeoff is flatter than predicted by the CAPM based on myriad empirical evidence. The ECAPM and the use of adjusted betas comprised two separate features of asset pricing. Even if a company's beta is estimated accurately, the CAPM still understates the return for low-beta stocks. Even if the ECAPM is used, the return for low-beta securities is understated if the betas are understated. Referring back to Figure 6-1, the ECAPM is a return (vertical axis) adjustment and not a beta (horizontal axis) adjustment. Both adjustments are necessary. Moreover, recall from Chapter 3 that the use of adjusted betas compensates for interest rate sensitivity of utility stocks not captured by unadjusted betas.

[13] The lowering of the tax burden on capital gains and dividend income has no impact as far as non-taxable institutional investors (pension funds, 401K, and mutual funds) are concerned, and such investors engage in very large amounts of trading on security markets. It is quite plausible that taxable retail investors are relatively inactive traders and that large non-taxable investors have a substantial influence on capital markets.

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Chapter 7

Firm Size and Return

The Firm Size Phenomenon

One of the most remarkable discoveries of modern finance is that of a relationship between firm size and return. The relationship cuts across the entire size spectrum but is most evident among smaller companies, which have higher returns on average than larger ones. Many studies have looked at the effect of firm size on return.[1] In this chapter, the returns across the entire range of firm size are examined.

Size and Liquidity

Capitalization is not necessarily the underlying cause of the higher returns for smaller companies. While smaller companies are usually less liquid, with fewer shares traded on any given day, not all companies of the same size have the same liquidity. Stocks that are more liquid have higher valuations for the same cash flows because they have a lower cost of capital and commensurately lower returns on average. Stocks that are less liquid have a higher cost of capital and higher returns on average.[2]

While it would be very useful to estimate the equity cost of capital of companies that are not publicly traded, there is not a direct measure of liquidity for these companies because there are no public trades. Thus, there is usually no share turnover, no bid/ask spreads, etc. in which to measure liquidity. Even though liquidity is not directly observable, capitalization is; thus the size premium can serve as a partial measure of the increased cost of capital of a less liquid stock.

Size premiums presented in this book are measured from publicly traded companies of various sizes and therefore do not represent the full cost of capital for non-traded companies. The valuation for a non-publicly traded company should also reflect a discount for the very fact that it is not traded. This would be an liquidity discount and could be applied to the valuation directly, or alternatively reflected as an liquidity premium in the cost of capital.

This chapter does not tell you how to estimate this incremental liquidity valuation discount (or cost of capital liquidity premium) that is not covered by the size premium. At the end of this chapter, we show some empirical results on the impact of liquidity on stock returns.

Construction of the Decile Portfolios

The portfolios used in this chapter are those created by the Center for Research in Security Prices (CRSP) at the University of Chicago's Graduate School of Business. CRSP has refined the methodology of creating size-based portfolios and has applied this methodology to the entire universe of NYSE/AMEX/NASDAQ-listed securities going back to 1926.

The New York Stock Exchange universe excludes closed-end mutual funds, preferred stocks, real estate investment trusts, foreign stocks, American Depository Receipts, unit investment trusts, and Americus Trusts. All companies on the NYSE are ranked by the combined market capitalization of their eligible equity securities. The companies are then split into 10 equally populated groups, or deciles. Eligible companies traded on the NYSE, the NYSE Amex (AMEX), and the Nasdaq National Market (NASDAQ) are then assigned to the appropriate deciles according to their capitalization in relation to the NYSE breakpoints. The portfolios are rebalanced, using closing prices for the last trading day of March, June, September, and December. Securities added during the quarter are assigned to the appropriate portfolio when two consecutive month-end prices are available. If the final NYSE price of a security that becomes delisted is a month-end price, then that month's return is included in the quarterly return of the security's portfolio. When a month-end NYSE price is missing, the month-end value of the security is derived from merger terms, quotations on regional exchanges, and other sources. If a month-end value still is not determined, the last available daily price is used.

In October 2008, NYSE Euronext acquired the American Stock Exchange (AMEX) and rebranded the index as NYSE Amex. To ease confusion, we will continue to refer to this index as AMEX throughout this chapter.

Table 10
Long-Horizon Expected Equity Risk Premium and Size Premium
As of December 31, 2013

Equity Risk Premium

Long-horizon expected equity risk premium (historical): Large company stock total returns minus long-term government bond income returns [1]	6.96%
Long-horizon expected equity risk premium (supply-side): historical equity risk premium minus price-to-earnings ratio calculated using three-year average earnings	6.12%

Size Premia (market capitalization in millions) [2]

Decile	Smallest Company		Largest Company	Size Premium (Return in Excess of CAPM)
Mid-Cap (3-5)	2,432.888	–	9,196.480	1.14%
Low-Cap (6-8)	636.747	–	2,431.229	1.87
Micro-Cap (9-10)	2.395	–	632.770	3.84

Breakdown of Deciles 1-10				
1 – Largest	21,753.411	–	428,699.798	-0.33%
2	9,196.656	–	21,739.006	0.80
3	5,572.648	–	9,196.480	0.93
4	3,581.547	–	5,569.840	1.19
5	2,432.888	–	3,573.079	1.72
6	1,622.997	–	2,431.229	1.75
7	1,056.204	–	1,621.792	1.75
8	636.747	–	1,055.320	2.48
9	339.522	–	632.770	2.76
10 – Smallest	2.395	–	338.829	6.01

[1] Expected equity risk premium is based on the difference of historical arithmetic mean returns for 1926-2013. Large company stocks are represented by the S&P 500.

[2] Return in excess of CAPM estimation. Mid-Cap stocks are defined here as the aggregate of size-deciles 3–5 of the NYSE/AMEX/NASDAQ; Low-Cap stocks are defined here as the aggregate of size-deciles 6–8 of the NYSE/AMEX/NASDAQ; Micro-Cap stocks are defined here as the aggregate of size-deciles 9–10 of the NYSE/AMEX/NASDAQ. The betas used in CAPM estimation were estimated from CRSP NYSE/AMEX/NASDAQ decile portfolio monthly total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 total returns in excess of the 30-day U.S. Treasury bill, January 1926–December 2013. Calculated (or Derived) based on data from CRSP US Stock Database and CRSP US Indices Database ©2014 Center for Research in Security Prices (CRSP®), The University of Chicago Booth School of Business. Used with permission.

WP-18
Avera/McKenzie

The Risk Premium Approach to Measuring a Utility's Cost of Equity

Eugene F. Brigham; Dilip K. Shome; Steve R. Vinson

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Cost of Capital Estimation

The Risk Premium Approach to Measuring a Utility's Cost of Equity

Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson

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■ In the mid-1960s, Myron Gordon and others began applying the theory of finance to help estimate utilities' costs of capital. Previously, the standard approach in cost of equity studies was the "comparable earnings method," which involved selecting a sample of unregulated companies whose investment risk was judged to be comparable to that of the utility in question, calculating the average return on book equity (ROE) of these sample companies, and setting the utility's service rates at a level that would permit the utility to achieve the same ROE as comparable companies. This procedure has now been thoroughly discredited (see Robichek [15]), and it has been replaced by three market-oriented (as opposed to accounting-oriented) approaches: (i) the DCF method, (ii) the bond-yield-plus-risk-premium method, and (iii) the CAPM, which is a specific version of the generalized bond-yield-plus-risk-premium approach.

Our purpose in this paper is to discuss the risk-premium approach, including the market risk premium that is used in the CAPM. First, we critique the various procedures that have been used in the past to estimate risk premiums. Second, we present some data on estimated risk premiums since 1965. Third, we examine the relationship between equity risk premiums and the level of interest rates, because it is important, for purposes of estimating the cost of capital, to know just how stable the relationship between risk premiums and interest rates is over time. If stability exists, then one can estimate the cost of equity at any point in time as a function of interest rates as reported in *The Wall Street Journal*, the *Federal Reserve Bulletin*, or some similar source.[1] Fourth, while we do not discuss the CAPM directly, our analysis does have some important implications for selecting a market risk premium for use in that model. Our focus is on utilities, but the methodology is applicable to the estimation of the cost of

[1]For example, the Federal Energy Regulatory Commission's Staff recently proposed that a risk premium be estimated every two years and that, between estimation dates, the last-determined risk premium be added to the current yield on ten-year Treasury bonds to obtain an estimate of the cost of equity to an average utility (Docket RM 80-36). Subsequently, the FCC made a similar proposal ("Notice of Proposed Rulemaking," August 13, 1984, Docket No. 84-800). Obviously, the validity of such procedures depends on (i) the accuracy of the risk premium estimate and (ii) the stability of the relationship between risk premiums and interest rates. Both proposals are still under review.

equity for any publicly traded firm, and also for non-traded firms for which an appropriate risk class can be assessed, including divisions of publicly traded corporations.[2]

Alternative Procedures for Estimating Risk Premiums

In a review of both rate cases and the academic literature, we have identified three basic methods for estimating equity risk premiums: (i) the *ex post*, or historic, yield spread method; (ii) the survey method; and (iii) an *ex ante* yield spread method based on DCF analysis.[3] In this section, we briefly review these three methods.

Historic Risk Premiums

A number of researchers, most notably Ibbotson and Sinquefield [12], have calculated historic holding period returns on different securities and then estimated risk premiums as follows:

$$\begin{array}{l}\text{Historic}\\ \text{Risk} \quad = \\ \text{Premium}\end{array}$$

$$\left(\begin{array}{c}\text{Average of the}\\ \text{annual returns on}\\ \text{a stock index for}\\ \text{a particular}\\ \text{past period}\end{array}\right) - \left(\begin{array}{c}\text{Average of the}\\ \text{annual returns on}\\ \text{a bond index for}\\ \text{the same}\\ \text{past period}\end{array}\right). \quad (1)$$

Ibbotson and Sinquefield (I&S) calculated both arithmetic and geometric average returns, but most of their risk-premium discussion was in terms of the geometric averages. Also, they used both corporate and Treasury bond indices, as well as a T-bill index, and they analyzed all possible holding periods since 1926. The I&S study has been employed in numerous rate cases in two ways: (i) directly, where the I&S historic risk premium is added to a company's bond yield to obtain an estimate of its cost of equity, and (ii) indirectly, where I&S data are used to estimate the market risk premium in CAPM studies.

There are both conceptual and measurement problems with using I&S data for purposes of estimating the cost of capital. Conceptually, there is no compelling reason to think that investors expect the same relative returns that were earned in the past. Indeed, evidence presented in the following sections indicates that relative expected returns should, and do, vary significantly over time. Empirically, the measured historic premium is sensitive both to the choice of estimation horizon and to the end points. These choices are essentially arbitrary, yet they can result in significant differences in the final outcome. These measurement problems are common to most forecasts based on time series data.

The Survey Approach

One obvious way to estimate equity risk premiums is to poll investors. Charles Benore [1], the senior utility analyst for Paine Webber Mitchell Hutchins, a leading institutional brokerage house, conducts such a survey of major institutional investors annually. His 1983 results are reported in Exhibit 1.

Exhibit 1. Results of Risk Premium Survey, 1983*

Assuming a double A, long-term utility bond currently yields 12½%, the common stock for the same company would be fairly priced relative to the bond if its expected return was as follows:

Total Return	Indicated Risk Premium (basis points)	Percent of Respondents
over 20½%	over 800	
20½%	800	
19½%	700	
18½%	600	10%
17½%	500	8%
16½%	400	29%
15½%	300	35%
14½%	200	16%
13½%	100	0%
under 13½%	under 100	1%
Weighted average	358	100%

*Benore's questionnaire included the first two columns, while his third column provided a space for the respondents to indicate which risk premium they thought applied. We summarized Benore's responses in the frequency distribution given in Column 3. Also, in his questionnaire each year, Benore adjusts the double A bond yield and the total returns (Column 1) to reflect current market conditions. Both the question above and the responses to it were taken from the survey conducted in April 1983.

[2]The FCC is particularly interested in risk-premium methodologies, because (i) only eighteen of the 1,400 telephone companies it regulates have publicly-traded stock, and hence offer the possibility of DCF analysis, and (ii) most of the publicly-traded telephone companies have both regulated and unregulated assets, so a corporate DCF cost might not be applicable to the regulated units of the companies.

[3]In rate cases, some witnesses also have calculated the differential between the yield to maturity (YTM) of a company's bonds and its concurrent ROE, and then called this differential a risk premium. In general, this procedure is unsound, because the YTM on a bond is a *future expected* return on the bond's *market value*, while the ROE is the *past realized* return on the stock's *book value*. Thus, comparing YTMs and ROEs is like comparing apples and oranges.

Benore's results, as measured by the average risk premiums, have varied over the years as follows:

Year	Average RP (basis points)
1978	491
1979	475
1980	423
1981	349
1982	275
1983	358

The survey approach is conceptually sound in that it attempts to measure investors' expectations regarding risk premiums, and the Benore data also seem to be carefully collected and processed. Therefore, the Benore studies do provide one useful basis for estimating risk premiums. However, as with most survey results, the possibility of biased responses and/or biased sampling always exists. For example, if the responding institutions are owners of utility stocks (and many of them are), and if the respondents think that the survey results might be used in a rate case, then they might bias upward their responses to help utilities obtain higher authorized returns. Also, Benore surveys large institutional investors, whereas a high percentage of utility stocks are owned by individuals rather than institutions, so there is a question as to whether his reported risk premiums are really based on the expectations of the "representative" investor. Finally, from a pragmatic standpoint, there is a question as to how to use the Benore data for utilities that are not rated AA. The Benore premiums can be applied as an add-on to the own-company bond yields of any given utility only if it can be assumed that the premiums are constant across bond rating classes. *A priori*, there is no reason to believe that the premiums will be constant.

DCF-Based *Ex Ante* Risk Premiums

In a number of studies, the DCF model has been used to estimate the *ex ante* market risk premium, RP_M. Here, one estimates the average expected future return on equity for a group of stocks, k_M, and then subtracts the concurrent risk-free rate, R_F, as proxied by the yield to maturity on either corporate or Treasury securities:[4]

$$RP_M = k_M - R_F. \qquad (2)$$

Conceptually, this procedure is exactly like the I&S approach except that one makes direct estimates of future expected returns on stocks and bonds rather than assuming that investors expect future returns to mirror past returns.

The most difficult task, of course, is to obtain a valid estimate of k_M, the expected rate of return on the market. Several studies have attempted to estimate DCF risk premiums for the utility industry and for other stock market indices. Two of these are summarized next.

Vandell and Kester. In a recently published monograph, Vandell and Kester [18] estimated *ex ante* risk premiums for the period from 1944 to 1978. R_F was measured both by the yield on 90-day T-bills and by the yield on the Standard and Poor's AA Utility Bond Index. They measured k_M as the average expected return on the S&P's 500 Index, with the expected return on individual securities estimated as follows:

$$k_i = \left(\frac{D_1}{P_0}\right)_i + g_i, \qquad (3)$$

where,

D_1 = dividend per share expected over the next twelve months,
P_0 = current stock price,
g = estimated long-term constant growth rate, and
i = the i^{th} stock.

To estimate g_i, Vandell and Kester developed fifteen forecasting models based on both exponential smoothing and trend-line forecasts of earnings and dividends, and they used historic data over several estimating horizons. Vandell and Kester themselves acknowledge that, like the Ibbotson-Sinquefield premiums, their analysis is subject to potential errors associated with trying to estimate expected future growth purely from past data. We shall have more to say about this point later.

[4]In this analysis, most people have used yields on long-term bonds rather than short-term money market instruments. It is recognized that long-term bonds, even Treasury bonds, are not risk free, so an RP_M based on these debt instruments is smaller than it would be if there were some better proxy to the long-term riskless rate. People have attempted to use the T-bill rate for R_F, but the T-bill rate embodies a different average inflation premium than stocks, and it is subject to random fluctuations caused by monetary policy, international currency flows, and other factors. Thus, many people believe that for cost of capital purposes, R_F should be based on long-term securities.

We did test to see how debt maturities would affect our calculated risk premiums. If a short-term rate such as the 30-day T-bill rate is used, measured risk premiums jump around widely and, so far as we could tell, randomly. The choice of a maturity in the 10- to 30-year range has little effect, as the yield curve is generally fairly flat in that range.

Malkiel. Malkiel [14] estimated equity risk premiums for the Dow Jones Industrials using the DCF model. Recognizing that the constant dividend growth assumption may not be valid, Malkiel used a nonconstant version of the DCF model. Also, rather than rely exclusively on historic data, he based his growth rates on Value Line's five-year earnings growth forecasts plus the assumption that each company's growth rate would, after an initial five-year period, move toward a long-run real national growth rate of four percent. He also used ten-year maturity government bonds as a proxy for the riskless rate. Malkiel reported that he tested the sensitivity of his results against a number of different types of growth rates, but, in his words, "The results are remarkably robust, and the estimated risk premiums are all very similar." Malkiel's is, to the best of our knowledge, the first risk-premium study that uses analysts' forecasts. A discussion of analysts' forecasts follows.

Security Analysts' Growth Forecasts

Ex ante DCF risk premium estimates can be based either on expected growth rates developed from time series data, such as Vandell and Kester used, or on analysts' forecasts, such as Malkiel used. Although there is nothing inherently wrong with time series-based growth rates, an increasing body of evidence suggests that primary reliance should be placed on analysts' growth rates. First, we note that the observed market price of a stock reflects the consensus view of investors regarding its future growth. Second, we know that most large brokerage houses, the larger institutional investors, and many investment advisory organizations employ security analysts who forecast future EPS and DPS, and, to the extent that investors rely on analysts' forecasts, the consensus of analysts' forecasts is embodied in market prices. Third, there have been literally dozens of academic research papers dealing with the accuracy of analysts' forecasts, as well as with the extent to which investors actually use them. For example, Cragg and Malkiel [7] and Brown and Rozeff [5] determined that security analysts' forecasts are more relevant in valuing common stocks and estimating the cost of capital than are forecasts based solely on historic time series. Stanley, Lewellen, and Schlarbaum [16] and Linke [13] investigated the importance of analysts' forecasts and recommendations to the investment decisions of individual and institutional investors. Both studies indicate that investors rely heavily on analysts' reports and incorporate analysts' forecast information in the formation of their expectations about stock returns. A representative listing of other work supporting the use of analysts' forecasts is included in the References section. Thus, evidence in the current literature indicates that (i) analysts' forecasts are superior to forecasts based solely on time series data, and (ii) investors do rely on analysts' forecasts. Accordingly, we based our cost of equity, and hence risk premium estimates, on analysts' forecast data.[5]

Risk Premium Estimates

For purposes of estimating the cost of capital using the risk premium approach, it is necessary either that the risk premiums be time-invariant or that there exists a predictable relationship between risk premiums and interest rates. If the premiums are constant over time, then the constant premium could be added to the prevailing interest rate. Alternatively, if there exists a stable relationship between risk premiums and interest rates, it could be used to predict the risk premium from the prevailing interest rate.

To test for stability, we obviously need to calculate risk premiums over a fairly long period of time. Prior to 1980, the only consistent set of data we could find came from Value Line, and, because of the work involved, we could develop risk premiums only once a year (on January 1). Beginning in 1980, however, we began collecting and analyzing Value Line data on a monthly basis, and in 1981 we added monthly estimates from Merrill Lynch and Salomon Brothers to our data base. Finally, in mid-1983, we expanded our analysis to include the IBES data.

Annual Data and Results, 1966–1984

Over the period 1966–1984, we used Value Line data to estimate risk premiums both for the electric utility industry and for industrial companies, using the companies included in the Dow Jones Industrial and Utility averages as representative of the two groups. Value Line makes a five-year growth rate forecast, but it also gives data from which one can develop a longer-term forecast. Since DCF theory calls for a truly long-term (infinite horizon) growth rate, we concluded that it was better to develop and use such a forecast than to

[5]Recently, a new type of service that summarizes the key data from most analysts' reports has become available. We are aware of two sources of such services, the Lynch, Jones, and Ryan's Institutional Brokers Estimate System (IBES) and Zack's Icarus Investment Service. IBES and the Icarus Service gather data from both buy-side and sell-side analysts and provide it to subscribers on a monthly basis in both a printed and a computer-readable format.