

Table A1. Total energy supply, disposition, and price summary
(quadrillion Btu per year, unless otherwise noted)

Supply, disposition, and prices	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Production								
Crude oil and lease condensate	18.60	19.34	23.69	24.30	24.60	24.69	23.42	0.6%
Natural gas plant liquids	4.72	5.04	6.84	7.13	7.23	7.28	7.40	1.2%
Dry natural gas	27.91	28.07	37.07	39.19	40.11	41.60	44.53	1.4%
Coal ¹	15.30	15.93	14.96	15.16	14.96	15.26	15.23	-0.1%
Nuclear / uranium ²	8.41	8.29	7.52	7.28	6.99	6.96	6.64	-0.7%
Conventional hydroelectric power	2.47	2.73	2.74	2.74	2.74	2.74	2.75	0.0%
Biomass ³	4.31	4.20	4.50	4.62	4.76	4.89	5.11	0.6%
Other renewable energy ⁴	3.11	3.44	5.79	6.28	7.40	8.09	9.47	3.1%
Other ⁵	0.78	1.33	0.90	0.74	0.78	0.81	0.83	-1.4%
Total	85.60	88.37	104.01	107.44	109.58	112.32	115.38	0.8%
Imports								
Crude oil	17.34	17.29	15.36	14.78	15.33	15.39	15.94	-0.2%
Petroleum and other liquids ⁶	4.45	5.96	4.51	3.80	3.52	3.61	3.50	-1.6%
Natural gas	3.10	3.10	2.66	2.46	2.28	2.01	1.21	-2.8%
Other imports ⁷	0.46	0.42	0.26	0.23	0.23	0.23	0.22	-1.9%
Total	25.35	26.77	22.79	21.26	21.37	21.24	20.88	-0.8%
Exports								
Petroleum and other liquids ⁸	10.04	12.80	16.37	16.72	17.74	17.73	15.36	0.6%
Natural gas	2.36	3.14	8.56	9.47	9.50	9.62	9.67	3.5%
Coal	1.60	1.95	1.76	1.77	1.84	2.16	2.11	0.2%
Total	13.99	17.89	26.69	27.97	29.08	29.51	27.14	1.3%
Discrepancy⁹	0.04	0.45	0.00	0.04	0.06	0.08	0.10	--
Consumption								
Petroleum and other liquids ¹⁰	37.09	37.50	36.66	35.73	35.40	35.71	37.38	0.0%
Natural gas	28.49	27.64	30.82	31.78	32.49	33.58	35.64	0.8%
Coal ¹¹	14.16	14.20	13.27	13.43	13.16	13.14	13.15	-0.2%
Nuclear / uranium ²	8.41	8.29	7.52	7.28	6.99	6.96	6.64	-0.7%
Conventional hydroelectric power	2.47	2.73	2.74	2.74	2.74	2.74	2.75	0.0%
Biomass ¹²	2.81	2.65	2.96	3.09	3.25	3.38	3.62	0.9%
Other renewable energy ⁴	3.11	3.44	5.79	6.28	7.40	8.09	9.47	3.1%
Other ¹³	0.37	0.35	0.34	0.36	0.36	0.37	0.37	0.2%
Total	96.91	96.80	100.10	100.70	101.80	103.98	109.03	0.4%
Prices (2017 dollars per unit)								
Crude oil spot prices (dollars per barrel)								
Brent	45	52	86	93	100	106	114	2.4%
West Texas Intermediate	44	50	82	89	95	101	110	2.4%
Natural gas at Henry Hub (dollars per million Btu)	2.57	3.05	4.07	4.26	4.26	4.50	5.01	1.5%
Coal (dollars per ton)								
at the minemouth ¹⁴	33.0	32.9	34.0	35.0	36.6	38.7	39.8	0.6%
Coal (dollars per million Btu)								
at the minemouth ¹⁴	1.65	1.63	1.69	1.75	1.82	1.91	1.97	0.6%
Average end-use ¹⁵	2.33	2.28	2.43	2.45	2.50	2.56	2.63	0.4%
Average electricity (cents per kilowatt-hour)	10.5	10.6	11.1	11.2	11.2	11.2	11.0	0.1%

Table A1. Total energy supply, disposition, and price summary (continued)
(quadrillion Btu per year, unless otherwise noted)

Supply, disposition, and prices	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Prices (nominal dollars per unit)								
Crude oil spot prices (dollars per barrel)								
Brent	44	52	104	125	150	179	244	4.8%
West Texas Intermediate	43	50	100	120	143	171	235	4.8%
Natural gas at Henry Hub (dollars per million Btu)	2.53	3.05	4.93	5.75	6.41	7.59	10.78	3.9%
Coal (dollars per ton)								
at the minemouth ¹⁴	32.4	32.9	41.2	47.3	55.2	65.3	85.5	2.9%
Coal (dollars per million Btu)								
at the minemouth ¹⁴	1.62	1.63	2.05	2.36	2.74	3.22	4.23	2.9%
Average end-use ¹⁵	2.29	2.28	2.94	3.31	3.77	4.33	5.65	2.8%
Average electricity (cents per kilowatthour)	10.3	10.6	13.5	15.2	16.9	18.9	23.6	2.5%

¹Includes waste coal.

²These values represent the energy obtained from uranium when it is used in light water reactors. The total energy content of uranium is much larger, but alternative processes are required to take advantage of it.

³Includes grid-connected electricity from wood and wood waste; biomass, such as corn, used for liquid fuels production; and non-electric energy demand from wood. Refer to Table A17 for details.

⁴Includes grid-connected electricity from landfill gas; biogenic municipal waste; wind; photovoltaic and solar thermal sources; and non-electric energy from renewable sources, such as active and passive solar systems. Excludes electricity imports using renewable sources and nonmarketed renewable energy. See Table A17 for selected nonmarketed residential and commercial renewable energy data.

⁵Includes non-biogenic municipal waste, liquid hydrogen, methanol, and some domestic inputs to refineries.

⁶Includes imports of finished petroleum products, unfinished oils, alcohols, ethers, blending components, and renewable fuels such as ethanol.

⁷Includes coal, coal coke (net), and electricity (net). Excludes imports of fuel used in nuclear power plants.

⁸Includes crude oil, petroleum products, ethanol, and biodiesel.

⁹Balancing item. Includes unaccounted for supply, losses, gains, and net storage withdrawals.

¹⁰Estimated consumption. Includes petroleum-derived fuels and non-petroleum derived fuels, such as ethanol and biodiesel, and coal-based synthetic liquids. Petroleum coke, which is a solid, is included. Also included are hydrocarbon gas liquids and crude oil consumed as a fuel. Refer to Table A17 for detailed renewable liquid fuels consumption.

¹¹Excludes coal converted to coal-based synthetic liquids and natural gas.

¹²Includes grid-connected electricity from wood and wood waste, non-electric energy from wood, and biofuels heat and coproducts used in the production of liquid fuels, but excludes the energy content of the liquid fuels.

¹³Includes non-biogenic municipal waste, liquid hydrogen, and net electricity imports.

¹⁴Includes reported prices for both open market and captive mines. Prices weighted by production, which differs from average minemouth prices published in EIA data reports where it is weighted by reported sales.

¹⁵Prices weighted by consumption; weighted average excludes export free-alongside-ship (f.a.s.) prices.

Btu = British thermal unit.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 natural gas supply values: U.S. Energy Information Administration (EIA), *Natural Gas Monthly*, July 2017). 2016 coal minemouth and delivered coal prices: EIA, *Annual Coal Report 2013*. 2016 petroleum supply values: EIA, *Petroleum Supply Annual 2016*. 2016 crude oil spot prices and natural gas spot price at Henry Hub: Thomson Reuters. Other 2016 coal values: *Quarterly Coal Report, October-December 2016*. Other 2016 values: EIA, *Monthly Energy Review*, September 2017. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A2. Energy consumption by sector and source
(quadrillion Btu per year, unless otherwise noted)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Energy consumption								
Residential								
Propane	0.43	0.49	0.40	0.38	0.37	0.35	0.33	-1.2%
Kerosene	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-2.9%
Distillate fuel oil.....	0.43	0.47	0.39	0.35	0.32	0.29	0.24	-2.0%
Petroleum and other liquids subtotal.....	0.87	0.97	0.80	0.74	0.69	0.64	0.58	-1.6%
Natural gas	4.51	4.54	4.74	4.74	4.72	4.69	4.70	0.1%
Renewable energy ¹	0.34	0.33	0.37	0.34	0.32	0.30	0.27	-0.6%
Electricity	4.80	4.69	4.74	4.81	4.89	5.02	5.27	0.4%
Delivered energy	10.53	10.53	10.66	10.63	10.62	10.65	10.82	0.1%
Electricity related losses	9.58	9.22	8.91	8.92	8.95	9.07	9.16	0.0%
Total	20.11	19.75	19.57	19.55	19.57	19.72	19.98	0.0%
Commercial								
Propane	0.14	0.14	0.17	0.18	0.19	0.20	0.22	1.3%
Motor gasoline ²	0.39	0.40	0.29	0.29	0.29	0.29	0.29	-0.9%
Kerosene	0.00	0.00	0.00	0.00	0.00	0.01	0.01	3.5%
Distillate fuel oil.....	0.35	0.37	0.36	0.35	0.34	0.33	0.32	-0.5%
Residual fuel oil	0.01	0.01	0.05	0.05	0.05	0.05	0.05	6.8%
Petroleum and other liquids subtotal.....	0.89	0.92	0.88	0.87	0.87	0.87	0.89	-0.1%
Natural gas	3.22	3.26	3.34	3.42	3.56	3.71	4.09	0.7%
Coal	0.02	0.02	0.04	0.04	0.04	0.04	0.04	2.2%
Renewable energy ³	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Electricity	4.64	4.61	4.77	4.84	4.92	5.05	5.51	0.5%
Delivered energy	8.91	8.94	9.15	9.31	9.53	9.80	10.66	0.5%
Electricity related losses	9.26	9.06	8.96	8.97	9.01	9.14	9.57	0.2%
Total	18.16	18.01	18.12	18.28	18.54	18.94	20.23	0.4%
Industrial⁴								
Liquefied petroleum gases and other ⁵	2.69	2.74	3.58	3.86	3.99	4.12	4.16	1.3%
Motor gasoline ²	0.26	0.26	0.28	0.28	0.29	0.29	0.31	0.5%
Distillate fuel oil.....	1.14	1.16	1.30	1.35	1.38	1.44	1.57	0.9%
Residual fuel oil	0.05	0.05	0.03	0.03	0.03	0.04	0.04	-0.6%
Petrochemical feedstocks.....	0.64	0.71	1.05	1.17	1.24	1.30	1.32	1.9%
Other petroleum ⁶	3.37	3.41	3.57	3.63	3.79	3.93	4.20	0.6%
Petroleum and other liquids subtotal.....	8.15	8.33	9.81	10.32	10.72	11.12	11.59	1.0%
Natural gas	8.01	8.06	9.17	9.46	9.81	10.22	10.80	0.9%
Natural-gas-to-liquids heat and power.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Lease and plant fuel ⁷	1.65	1.67	2.06	2.14	2.17	2.24	2.31	1.0%
Natural gas to liquefy gas for export ⁸	0.02	0.07	0.48	0.55	0.55	0.55	0.55	6.5%
Natural gas subtotal.....	9.68	9.80	11.71	12.15	12.53	13.02	13.67	1.0%
Metallurgical coal.....	0.47	0.52	0.44	0.47	0.51	0.52	0.51	-0.1%
Other industrial coal.....	0.69	0.65	0.76	0.73	0.70	0.70	0.70	0.2%
Coal-to-liquids heat and power.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Net coal coke imports	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-0.4%
Coal subtotal.....	1.14	1.16	1.17	1.18	1.19	1.20	1.19	0.1%
Biofuels heat and coproducts	0.83	0.82	0.86	0.86	0.86	0.86	0.83	0.0%
Renewable energy ⁹	1.47	1.46	1.76	1.97	2.17	2.34	2.68	1.9%
Electricity	3.19	3.23	3.75	3.89	3.98	4.10	4.26	0.8%
Delivered energy	24.46	24.78	29.06	30.38	31.45	32.63	34.22	1.0%
Electricity related losses	6.37	6.34	7.04	7.21	7.28	7.41	7.40	0.5%
Total	30.84	31.13	36.10	37.59	38.73	40.04	41.61	0.9%

Table A2. Energy consumption by sector and source (continued)
(quadrillion Btu per year, unless otherwise noted)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Transportation								
Propane	0.01	0.01	0.01	0.01	0.01	0.01	0.02	1.8%
Motor gasoline ²	16.60	16.62	14.10	12.62	11.76	11.39	11.72	-1.1%
of which: E85 ¹⁰	0.01	0.01	0.22	0.27	0.30	0.30	0.16	8.8%
Jet fuel ¹¹	2.77	2.79	3.17	3.44	3.71	3.99	4.56	1.5%
Distillate fuel oil ¹²	6.55	6.66	6.41	6.23	6.12	6.17	6.44	-0.1%
Residual fuel oil	0.70	0.70	0.69	0.67	0.64	0.60	0.56	-0.7%
Other petroleum ¹³	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.2%
Petroleum and other liquids subtotal	26.78	26.94	24.54	23.13	22.40	22.32	23.47	-0.4%
Pipeline and distribution fuel natural gas	0.70	0.64	0.70	0.70	0.71	0.72	0.75	0.5%
Compressed / liquefied natural gas	0.07	0.08	0.18	0.24	0.31	0.40	0.61	6.2%
Liquid hydrogen	0.00	0.00	0.02	0.03	0.04	0.04	0.05	13.5%
Electricity	0.03	0.04	0.13	0.22	0.32	0.41	0.57	8.5%
Delivered energy	27.59	27.70	25.58	24.32	23.78	23.89	25.44	-0.3%
Electricity related losses	0.07	0.08	0.25	0.41	0.58	0.74	0.99	8.1%
Total	27.66	27.77	25.83	24.74	24.36	24.62	26.44	-0.1%
Unspecified sector¹⁴	0.14	0.15	0.49	0.55	0.60	0.66	0.77	5.1%
Delivered energy consumption for all sectors								
Liquefied petroleum gases and other ⁵	3.27	3.38	4.17	4.44	4.56	4.68	4.72	1.0%
Motor gasoline ²	17.28	17.24	14.68	13.21	12.35	11.98	12.33	-1.0%
of which: E85 ¹⁰	0.01	0.01	0.22	0.27	0.30	0.30	0.16	8.8%
Jet fuel ¹¹	3.33	3.42	3.82	4.14	4.47	4.80	5.50	1.5%
Kerosene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.5%
Distillate fuel oil	8.03	8.23	8.29	8.10	7.99	8.06	8.39	0.1%
Residual fuel oil	0.75	0.75	0.78	0.75	0.72	0.68	0.65	-0.4%
Petrochemical feedstocks	0.64	0.71	1.05	1.17	1.24	1.30	1.32	1.9%
Other petroleum ¹⁵	3.53	3.57	3.73	3.79	3.95	4.09	4.37	0.6%
Petroleum and other liquids subtotal	36.83	37.31	36.53	35.61	35.29	35.61	37.29	0.0%
Natural gas	15.81	15.94	17.43	17.87	18.41	19.02	20.20	0.7%
Natural-gas-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Lease and plant fuel ⁷	1.65	1.67	2.06	2.14	2.17	2.24	2.31	1.0%
Natural gas to liquefy gas for export ⁸	0.02	0.07	0.48	0.55	0.55	0.55	0.55	6.5%
Pipeline and distribution fuel natural gas	0.70	0.64	0.70	0.70	0.71	0.72	0.75	0.5%
Natural gas subtotal	18.18	18.32	20.67	21.26	21.84	22.53	23.81	0.8%
Metallurgical coal	0.47	0.52	0.44	0.47	0.51	0.52	0.51	-0.1%
Other coal	0.72	0.67	0.79	0.77	0.74	0.73	0.73	0.3%
Coal-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Net coal coke imports	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-0.4%
Coal subtotal	1.17	1.17	1.21	1.21	1.23	1.23	1.23	0.1%
Biofuels heat and coproducts	0.83	0.82	0.86	0.86	0.86	0.86	0.83	0.0%
Renewable energy ¹⁶	1.95	1.92	2.26	2.45	2.62	2.77	3.09	1.4%
Liquid hydrogen	0.00	0.00	0.02	0.03	0.04	0.04	0.05	13.5%
Electricity	12.67	12.56	13.39	13.76	14.11	14.58	15.61	0.7%
Delivered energy	71.63	72.10	74.93	75.18	75.98	77.62	81.91	0.4%
Electricity related losses	25.28	24.70	25.17	25.51	25.82	26.36	27.12	0.3%
Total	96.91	96.80	100.10	100.70	101.80	103.98	109.03	0.4%
Electric power¹⁷								
Distillate fuel oil	0.06	0.10	0.09	0.08	0.07	0.07	0.07	-1.2%
Residual fuel oil	0.19	0.09	0.04	0.04	0.04	0.03	0.02	-4.5%
Petroleum and other liquids subtotal	0.25	0.19	0.14	0.12	0.11	0.10	0.09	-2.4%
Natural gas	10.31	9.32	10.15	10.52	10.65	11.05	11.83	0.7%
Steam coal	13.00	13.02	12.06	12.22	11.93	11.91	11.92	-0.3%
Nuclear / uranium ¹⁸	8.41	8.29	7.52	7.28	6.99	6.96	6.64	-0.7%
Renewable energy ¹⁹	5.61	6.08	8.37	8.81	9.91	10.58	11.93	2.1%
Non-biogenic municipal waste	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Electricity imports	0.24	0.22	0.19	0.20	0.19	0.19	0.19	-0.5%
Total	37.95	37.26	38.56	39.27	39.93	40.94	42.73	0.4%

Table A2. Energy consumption by sector and source (continued)
(quadrillion Btu per year, unless otherwise noted)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Total energy consumption								
Liquefied petroleum gases and other ⁵	3.27	3.38	4.17	4.44	4.56	4.68	4.72	1.0%
Motor gasoline ²	17.28	17.24	14.68	13.21	12.35	11.98	12.33	-1.0%
of which: E85 ¹⁰	0.01	0.01	0.22	0.27	0.30	0.30	0.16	8.8%
Jet fuel ¹¹	3.33	3.42	3.82	4.14	4.47	4.80	5.50	1.5%
Kerosene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.5%
Distillate fuel oil	8.09	8.33	8.38	8.18	8.06	8.13	8.46	0.0%
Residual fuel oil	0.94	0.85	0.82	0.79	0.76	0.71	0.67	-0.7%
Petrochemical feedstocks	0.64	0.71	1.05	1.17	1.24	1.30	1.32	1.9%
Other petroleum ¹⁵	3.53	3.57	3.73	3.79	3.95	4.09	4.37	0.6%
Petroleum and other liquids subtotal	37.09	37.50	36.66	35.73	35.40	35.71	37.38	0.0%
Natural gas	26.12	25.27	27.59	28.39	29.06	30.07	32.03	0.7%
Natural-gas-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Lease and plant fuel ⁷	1.65	1.67	2.06	2.14	2.17	2.24	2.31	1.0%
Natural gas to liquefy gas for export ⁸	0.02	0.07	0.48	0.55	0.55	0.55	0.55	6.5%
Pipeline and distribution fuel natural gas	0.70	0.64	0.70	0.70	0.71	0.72	0.75	0.5%
Natural gas subtotal	28.49	27.64	30.82	31.78	32.49	33.58	35.64	0.8%
Metallurgical coal	0.47	0.52	0.44	0.47	0.51	0.52	0.51	-0.1%
Other coal	13.71	13.69	12.85	12.99	12.67	12.64	12.65	-0.2%
Coal-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Net coal coke imports	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-0.4%
Coal subtotal	14.16	14.20	13.27	13.43	13.16	13.14	13.15	-0.2%
Nuclear / uranium ¹⁸	8.41	8.29	7.52	7.28	6.99	6.96	6.64	-0.7%
Biofuels heat and coproducts	0.83	0.82	0.86	0.86	0.86	0.86	0.83	0.0%
Renewable energy ²⁰	7.55	8.00	10.63	11.25	12.53	13.36	15.01	1.9%
Liquid hydrogen	0.00	0.00	0.02	0.03	0.04	0.04	0.05	13.5%
Non-biogenic municipal waste	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Electricity imports	0.24	0.22	0.19	0.20	0.19	0.19	0.19	-0.5%
Total	96.91	96.80	100.10	100.70	101.80	103.98	109.03	0.4%
Energy use and related statistics								
Delivered energy use	71.63	72.10	74.93	75.18	75.98	77.62	81.91	0.4%
Total energy use	96.91	96.80	100.10	100.70	101.80	103.98	109.03	0.4%
Ethanol consumed in motor gasoline and E85	1.21	1.22	1.21	1.12	1.06	1.06	1.14	-0.2%
Population (millions)	324	326	347	359	370	379	398	0.6%
Gross domestic product (billion 2009 dollars)	16,716	17,075	20,221	22,421	24,802	27,356	33,205	2.0%
Carbon dioxide emissions (million metric tons)	5,174	5,151	5,079	5,053	5,024	5,080	5,279	0.1%

¹Includes wood used for residential heating. See Table A4 and/or Table A17 for estimates of nonmarketed renewable energy consumption for geothermal heat pumps, solar thermal water heating, and electricity generation from wind and solar photovoltaic sources.

²Includes ethanol and ethers blended into gasoline.

³Excludes ethanol. Includes commercial sector consumption of wood and wood waste, landfill gas, municipal waste, and other biomass for combined heat and power. See Table A5 and/or Table A17 for estimates of nonmarketed renewable energy consumption for solar thermal water heating and electricity generation from wind and solar photovoltaic sources.

⁴Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

⁵Includes ethane, natural gasoline, and refinery olefins.

⁶Includes petroleum coke, asphalt, road oil, lubricants, still gas, and miscellaneous petroleum products.

⁷Represents natural gas used in well, field, and lease operations, and in natural gas processing plant machinery.

⁸Fuel used in facilities that liquefy natural gas for export.

⁹Includes consumption of energy produced from hydroelectric, wood and wood waste, municipal waste, and other biomass sources. Excludes ethanol in motor gasoline.

¹⁰E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). To address cold starting issues, the percentage of ethanol varies seasonally. The annual average ethanol content of 74 percent is used for these projections.

¹¹Includes only kerosene type.

¹²Diesel fuel for on- and off- road use.

¹³Includes aviation gasoline and lubricants.

¹⁴Represents consumption unattributed to the sectors above.

¹⁵Includes aviation gasoline, petroleum coke, asphalt, road oil, lubricants, still gas, and miscellaneous petroleum products.

¹⁶Includes electricity generated for sale to the grid and for own use from renewable sources, and non-electric energy from renewable sources. Excludes ethanol and nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.

¹⁷Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.

¹⁸These values represent the energy obtained from uranium when it is used in light water reactors. The total energy content of uranium is much larger, but alternative processes are required to take advantage of it.

¹⁹Includes conventional hydroelectric, geothermal, wood and wood waste, biogenic municipal waste, other biomass, wind, photovoltaic, and solar thermal sources. Excludes net electricity imports.

²⁰Includes conventional hydroelectric, geothermal, wood and wood waste, biogenic municipal waste, other biomass, wind, photovoltaic, and solar thermal sources. Excludes ethanol, net electricity imports, and nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.

Btu = British thermal unit.

-- = Not applicable.

Note: Includes estimated consumption for petroleum and other liquids. Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 consumption based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. 2016 and 2017 population and gross domestic product: IHS Markit, *Macroeconomic model*, August 2017. 2016 carbon dioxide emissions and emission factors: EIA, *Monthly Energy Review*, September 2017. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. **Projections:** EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A3. Energy prices by sector and source
(nominal dollars per million Btu, unless otherwise noted)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Residential								
Propane	16.56	17.29	18.51	19.05	20.12	21.06	22.73	0.8%
Distillate fuel oil	15.61	18.19	26.57	27.79	29.02	30.16	30.58	1.6%
Natural gas	9.93	10.77	12.01	12.29	12.48	12.80	13.49	0.7%
Electricity	37.46	37.12	40.57	41.17	41.32	41.29	40.74	0.3%
Commercial								
Propane	14.82	15.44	16.54	17.00	17.93	18.73	20.16	0.8%
Distillate fuel oil	13.76	16.04	22.15	23.39	24.61	25.74	26.12	1.5%
Residual fuel oil	5.27	7.05	11.67	12.75	13.73	14.66	15.45	2.4%
Natural gas	7.24	7.82	9.46	9.61	9.68	9.90	10.45	0.9%
Electricity	31.23	31.32	32.95	33.20	32.98	32.79	31.78	0.0%
Industrial¹								
Propane	11.67	12.42	13.48	14.01	15.11	16.06	17.77	1.1%
Distillate fuel oil	13.74	16.01	21.86	23.11	24.36	25.51	25.88	1.5%
Residual fuel oil	5.00	6.67	13.36	14.43	15.37	16.27	16.96	2.9%
Natural gas ²	3.47	3.95	4.92	5.06	5.07	5.31	5.88	1.2%
Metallurgical coal	4.30	4.24	4.57	4.65	4.75	4.83	5.13	0.6%
Other industrial coal	3.30	3.26	3.40	3.39	3.37	3.41	3.53	0.2%
Coal to liquids	--	--	--	--	--	--	--	--
Electricity	20.21	21.38	21.78	21.88	21.77	21.68	21.34	0.0%
Transportation								
Propane	17.74	18.47	20.04	20.60	21.64	22.55	24.17	0.8%
E85 ³	20.81	22.29	26.00	24.19	24.33	25.79	33.23	1.2%
Motor gasoline ⁴	19.12	20.80	26.99	27.79	28.77	29.76	30.72	1.2%
Jet fuel ⁵	9.98	11.95	18.99	20.30	21.72	23.10	24.41	2.2%
Diesel fuel (distillate fuel oil) ⁶	17.22	19.29	25.82	27.13	28.38	29.49	29.73	1.3%
Residual fuel oil	6.26	8.36	13.06	14.22	15.16	16.02	16.65	2.1%
Natural gas ⁷	14.28	14.45	13.81	13.17	12.73	12.71	13.11	-0.3%
Electricity	28.89	31.15	39.32	40.55	40.41	39.59	37.59	0.6%
Electric power⁸								
Distillate fuel oil	12.15	14.12	20.93	21.73	22.88	24.03	24.79	1.7%
Residual fuel oil	8.31	10.53	15.04	16.00	16.89	17.53	17.51	1.6%
Natural gas	2.93	3.47	4.48	4.62	4.61	4.86	5.42	1.4%
Steam coal	2.20	2.15	2.28	2.31	2.35	2.41	2.46	0.4%
Uranium	0.65	0.65	0.66	0.67	0.67	0.68	0.70	0.2%
Average price to all users⁹								
Propane	14.29	15.20	16.78	17.23	18.22	19.06	20.59	0.9%
E85 ³	20.81	22.29	26.00	24.19	24.33	25.79	33.23	1.2%
Motor gasoline ⁴	19.11	20.78	27.00	27.79	28.77	29.77	30.72	1.2%
Jet fuel ⁵	9.98	11.95	18.99	20.30	21.72	23.10	24.41	2.2%
Distillate fuel oil	16.46	18.56	25.01	26.29	27.48	28.59	28.84	1.3%
Residual fuel oil	6.61	8.50	13.09	14.23	15.17	16.02	16.60	2.0%
Natural gas	4.87	5.53	6.59	6.73	6.77	6.99	7.56	0.9%
Metallurgical coal	4.30	4.24	4.57	4.65	4.75	4.83	5.13	0.6%
Other coal	2.26	2.20	2.35	2.38	2.41	2.47	2.53	0.4%
Coal to liquids	--	--	--	--	--	--	--	--
Electricity	30.81	30.93	32.59	32.90	32.88	32.78	32.17	0.1%
Non-renewable energy expenditures by sector (billion 2017 dollars)								
Residential	239	240	267	273	278	283	293	0.6%
Commercial	183	186	208	214	218	224	241	0.8%
Industrial ¹	155	173	245	264	281	302	331	2.0%
Transportation	464	516	629	618	627	654	720	1.0%
Total non-renewable expenditures	1,041	1,116	1,350	1,369	1,404	1,463	1,585	1.1%
Transportation renewable expenditures	0	0	6	7	7	8	5	10.1%
Total expenditures	1,041	1,116	1,355	1,375	1,411	1,471	1,590	1.1%

Table A3. Energy prices by sector and source (continued)
(nominal dollars per million Btu, unless otherwise noted)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Residential								
Propane	16.28	17.29	22.41	25.71	30.31	35.53	48.86	3.2%
Distillate fuel oil	15.34	18.19	32.17	37.50	43.71	50.90	65.72	4.0%
Natural gas	9.76	10.77	14.54	16.58	18.79	21.60	28.99	3.0%
Electricity	36.82	37.12	49.12	55.56	62.23	69.66	87.56	2.6%
Commercial								
Propane	14.56	15.44	20.02	22.95	27.00	31.60	43.33	3.2%
Distillate fuel oil	13.52	16.04	26.82	31.56	37.07	43.43	56.13	3.9%
Residual fuel oil	5.18	7.05	14.13	17.21	20.68	24.74	33.20	4.8%
Natural gas	7.11	7.82	11.45	12.97	14.59	16.70	22.46	3.2%
Electricity	30.69	31.32	39.89	44.81	49.68	55.32	68.30	2.4%
Industrial¹								
Propane	11.47	12.42	16.32	18.90	22.76	27.10	38.20	3.5%
Distillate fuel oil	13.50	16.01	26.46	31.19	36.69	43.04	55.62	3.8%
Residual fuel oil	4.91	6.67	16.18	19.48	23.15	27.45	36.45	5.3%
Natural gas ²	3.41	3.95	5.96	6.83	7.64	8.96	12.63	3.6%
Metallurgical coal	4.23	4.24	5.53	6.28	7.15	8.15	11.03	2.9%
Other industrial coal	3.24	3.26	4.12	4.57	5.08	5.75	7.58	2.6%
Coal to liquids	--	--	--	--	--	--	--	--
Electricity	19.86	21.38	26.36	29.52	32.79	36.58	45.86	2.3%
Transportation								
Propane	17.44	18.47	24.27	27.80	32.60	38.05	51.95	3.2%
E85 ³	20.45	22.29	31.47	32.64	36.64	43.51	71.41	3.6%
Motor gasoline ⁴	18.79	20.80	32.68	37.50	43.33	50.22	66.02	3.6%
Jet fuel ⁵	9.81	11.95	22.99	27.40	32.72	38.98	52.46	4.6%
Diesel fuel (distillate fuel oil) ⁶	16.93	19.29	31.25	36.62	42.75	49.77	63.89	3.7%
Residual fuel oil	6.15	8.36	15.81	19.20	22.83	27.03	35.78	4.5%
Natural gas ⁷	14.03	14.45	16.72	17.77	19.18	21.45	28.17	2.0%
Electricity	28.39	31.15	47.60	54.72	60.87	66.80	80.80	2.9%
Electric power⁸								
Distillate fuel oil	11.94	14.12	25.33	29.32	34.46	40.54	53.27	4.1%
Residual fuel oil	8.17	10.53	18.21	21.59	25.44	29.57	37.64	3.9%
Natural gas	2.88	3.47	5.42	6.24	6.95	8.21	11.64	3.7%
Steam coal	2.16	2.15	2.76	3.11	3.54	4.06	5.29	2.8%
Uranium	0.63	0.65	0.80	0.90	1.02	1.15	1.51	2.6%

Table A3. Energy prices by sector and source (continued)
(nominal dollars per million Btu, unless otherwise noted)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Average price to all users⁹								
Propane.....	14.05	15.20	20.31	23.26	27.44	32.16	44.24	3.3%
E85 ³	20.45	22.29	31.47	32.64	36.64	43.51	71.41	3.6%
Motor gasoline ⁴	18.78	20.78	32.68	37.50	43.34	50.23	66.03	3.6%
Jet fuel ⁵	9.81	11.95	22.99	27.40	32.72	38.98	52.46	4.6%
Distillate fuel oil.....	16.17	18.56	30.28	35.48	41.40	48.24	61.98	3.7%
Residual fuel oil.....	6.49	8.50	15.85	19.21	22.84	27.02	35.68	4.4%
Natural gas.....	4.78	5.53	7.98	9.09	10.19	11.79	16.25	3.3%
Metallurgical coal.....	4.23	4.24	5.53	6.28	7.15	8.15	11.03	2.9%
Other coal.....	2.22	2.20	2.85	3.21	3.64	4.17	5.44	2.8%
Coal to liquids.....	--	--	--	--	--	--	--	--
Electricity.....	30.28	30.93	39.45	44.40	49.52	55.31	69.14	2.5%
Non-renewable energy expenditures by sector (billion nominal dollars)								
Residential.....	235	240	324	369	418	478	630	3.0%
Commercial.....	179	186	252	289	328	378	517	3.1%
Industrial ¹	152	173	297	356	423	509	711	4.4%
Transportation.....	456	516	762	834	945	1,103	1,547	3.4%
Total non-renewable expenditures.....	1,023	1,116	1,634	1,847	2,114	2,469	3,406	3.4%
Transportation renewable expenditures.....	0	0	7	9	11	13	12	12.7%
Total expenditures.....	1,023	1,116	1,641	1,856	2,125	2,482	3,418	3.5%

¹Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

²Excludes use for lease and plant fuel and fuel used for liquefaction in export facilities.

³E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). To address cold starting issues, the percentage of ethanol varies seasonally. The annual average ethanol content of 74 percent is used for these projections.

⁴Sales weighted-average price for all grades. Includes Federal, State, and local taxes.

⁵Kerosene-type jet fuel. Includes Federal and State taxes while excluding county and local taxes.

⁶Diesel fuel for on-road use. Includes Federal and State taxes while excluding county and local taxes.

⁷Natural gas used as fuel in motor vehicles, trains, and ships. Includes estimated motor vehicle fuel taxes and estimated dispensing costs or charges.

⁸Includes electricity-only and combined heat and power plants that have a regulatory status.

⁹Weighted averages of end-use fuel prices are derived from the prices shown in each sector and the corresponding sectoral consumption.

Btu = British thermal unit.

-- = Not applicable.

Note: Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 prices for motor gasoline, distillate fuel oil, and jet fuel are based on prices in the U.S. Energy Information Administration (EIA), *Petroleum Marketing Monthly*, July 2017. 2016 residential and commercial natural gas delivered prices: EIA, *Natural Gas Monthly*, July 2017). 2016 industrial natural gas delivered prices derived on: EIA, *Manufacturing Energy Consumption Survey*, 2002-2014. 2016 transportation sector natural gas delivered prices are model results. 2016 electric power sector distillate and residual fuel oil prices: EIA, *Monthly Energy Review*, September 2017. 2016 electric power sector natural gas prices: EIA, *Electric Power Monthly*, July 2017, Table 4.13.B, and EIA, *State Energy Data Report 2015*. 2016 coal prices based on: EIA, *Quarterly Coal Report*, October-December 2016 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. 2016 electricity prices: EIA, *Monthly Energy Review*, September 2017. 2016 E85 prices derived from monthly prices in the Clean Cities Alternative Fuel Price Report. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. **Projections:** EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A4. Residential sector key indicators and consumption
(quadrillion Btu per year, unless otherwise noted)

Key indicators and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Key indicators								
Households (millions)								
Single-family	81.09	81.69	87.52	90.95	94.36	97.88	105.28	0.8%
Multifamily	29.12	29.35	31.91	33.63	35.46	37.22	40.47	1.0%
Mobile homes	5.84	5.74	5.20	5.01	4.84	4.70	4.68	-0.6%
Total	116.05	116.77	124.63	129.60	134.66	139.81	150.44	0.8%
Average house square footage	1,704	1,713	1,775	1,808	1,840	1,871	1,934	0.4%
Energy intensity								
(million Btu per household)								
Delivered energy consumption	90.7	90.2	85.5	82.0	78.8	76.1	71.9	-0.7%
Total energy consumption	173.3	169.1	157.0	150.8	145.3	141.0	132.8	-0.7%
(thousand Btu per square foot)								
Delivered energy consumption	53.2	52.6	48.2	45.4	42.8	40.7	37.2	-1.0%
Total energy consumption	101.7	98.7	88.5	83.4	79.0	75.4	68.7	-1.1%
Delivered energy consumption by fuel								
Purchased electricity								
Space heating	0.30	0.29	0.33	0.32	0.31	0.30	0.29	0.0%
Space cooling	0.88	0.72	0.80	0.84	0.88	0.92	1.01	1.0%
Water heating	0.44	0.45	0.44	0.44	0.43	0.42	0.44	0.0%
Refrigeration	0.34	0.34	0.32	0.32	0.33	0.34	0.38	0.3%
Cooking	0.11	0.11	0.12	0.12	0.13	0.14	0.15	0.9%
Clothes dryers	0.19	0.19	0.18	0.18	0.19	0.20	0.22	0.4%
Freezers	0.07	0.07	0.07	0.06	0.06	0.06	0.06	-0.4%
Lighting	0.46	0.44	0.37	0.36	0.32	0.30	0.26	-1.6%
Clothes washers ¹	0.03	0.03	0.02	0.02	0.02	0.02	0.02	-1.0%
Dishwashers ¹	0.09	0.09	0.10	0.11	0.12	0.12	0.14	1.2%
Televisions and related equipment ²	0.28	0.28	0.25	0.26	0.28	0.31	0.35	0.7%
Computers and related equipment ³	0.11	0.10	0.08	0.07	0.06	0.05	0.03	-3.4%
Furnace fans and boiler circulation pumps	0.10	0.11	0.11	0.11	0.10	0.10	0.09	-0.3%
Other uses ⁴	1.39	1.47	1.56	1.61	1.67	1.73	1.83	0.7%
Delivered energy	4.80	4.69	4.74	4.81	4.89	5.02	5.27	0.4%
Natural gas								
Space heating	2.72	2.76	2.89	2.84	2.81	2.77	2.68	-0.1%
Space cooling	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.2%
Water heating	1.25	1.26	1.33	1.37	1.38	1.38	1.47	0.5%
Cooking	0.21	0.21	0.22	0.22	0.23	0.23	0.25	0.5%
Clothes dryers	0.05	0.05	0.05	0.06	0.06	0.07	0.07	1.1%
Other uses ⁵	0.25	0.25	0.23	0.23	0.22	0.22	0.21	-0.5%
Delivered energy	4.51	4.54	4.74	4.74	4.72	4.69	4.70	0.1%
Distillate fuel oil								
Space heating	0.38	0.42	0.36	0.32	0.29	0.27	0.22	-1.9%
Water heating	0.05	0.04	0.03	0.02	0.02	0.02	0.01	-3.6%
Other uses ⁶	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.6%
Delivered energy	0.43	0.47	0.39	0.35	0.32	0.29	0.24	-2.0%
Propane								
Space heating	0.30	0.36	0.27	0.26	0.24	0.22	0.20	-1.7%
Water heating	0.06	0.06	0.05	0.05	0.04	0.04	0.03	-1.6%
Cooking	0.03	0.03	0.03	0.03	0.02	0.02	0.02	-0.5%
Other uses ⁶	0.05	0.05	0.05	0.06	0.06	0.06	0.07	1.4%
Delivered energy	0.43	0.49	0.40	0.38	0.37	0.35	0.33	-1.2%
Marketed renewables (wood) ⁷	0.34	0.33	0.37	0.34	0.32	0.30	0.27	-0.6%
Kerosene	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-2.9%

Table A4. Residential sector key indicators and consumption (continued)
(quadrillion Btu per year, unless otherwise noted)

Key indicators and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Delivered energy consumption by end use								
Space heating.....	4.05	4.16	4.23	4.09	3.97	3.87	3.67	-0.4%
Space cooling.....	0.90	0.74	0.82	0.86	0.90	0.94	1.03	1.0%
Water heating.....	1.80	1.81	1.85	1.87	1.87	1.86	1.96	0.3%
Refrigeration.....	0.34	0.34	0.32	0.32	0.33	0.34	0.38	0.3%
Cooking.....	0.35	0.35	0.36	0.37	0.38	0.39	0.42	0.6%
Clothes dryers.....	0.24	0.24	0.23	0.24	0.25	0.26	0.29	0.6%
Freezers.....	0.07	0.07	0.07	0.06	0.06	0.06	0.06	-0.4%
Lighting.....	0.46	0.44	0.37	0.36	0.32	0.30	0.26	-1.6%
Clothes washers ¹	0.03	0.03	0.02	0.02	0.02	0.02	0.02	-1.0%
Dishwashers ¹	0.09	0.09	0.10	0.11	0.12	0.12	0.14	1.2%
Televisions and related equipment ²	0.28	0.28	0.25	0.26	0.28	0.31	0.35	0.7%
Computers and related equipment ³	0.11	0.10	0.08	0.07	0.06	0.05	0.03	-3.4%
Furnace fans and boiler circulation pumps.....	0.10	0.11	0.11	0.11	0.10	0.10	0.09	-0.3%
Other uses ⁸	1.69	1.77	1.86	1.91	1.96	2.02	2.11	0.5%
Delivered energy.....	10.53	10.53	10.66	10.63	10.62	10.65	10.82	0.1%
Electricity related losses.....	9.58	9.22	8.91	8.92	8.95	9.07	9.16	0.0%
Total energy consumption by end use								
Space heating.....	4.65	4.74	4.86	4.69	4.55	4.42	4.17	-0.4%
Space cooling.....	2.65	2.16	2.33	2.41	2.51	2.62	2.77	0.8%
Water heating.....	2.69	2.68	2.67	2.69	2.65	2.62	2.73	0.1%
Refrigeration.....	1.03	1.01	0.91	0.90	0.92	0.97	1.04	0.1%
Cooking.....	0.56	0.56	0.58	0.60	0.62	0.64	0.68	0.6%
Clothes dryers.....	0.62	0.62	0.57	0.58	0.60	0.63	0.67	0.3%
Freezers.....	0.22	0.22	0.19	0.18	0.17	0.17	0.18	-0.6%
Lighting.....	1.36	1.31	1.06	1.02	0.91	0.84	0.72	-1.8%
Clothes washers ¹	0.08	0.07	0.05	0.05	0.04	0.05	0.05	-1.3%
Dishwashers ¹	0.28	0.28	0.28	0.31	0.33	0.35	0.38	0.9%
Televisions and related equipment ²	0.85	0.82	0.71	0.73	0.79	0.86	0.95	0.4%
Computers and related equipment ³	0.32	0.31	0.23	0.20	0.17	0.15	0.09	-3.6%
Furnace fans and boiler circulation pumps.....	0.31	0.31	0.32	0.30	0.28	0.27	0.26	-0.6%
Other uses ⁸	4.47	4.65	4.79	4.90	5.01	5.15	5.29	0.4%
Total.....	20.11	19.75	19.57	19.55	19.57	19.72	19.98	0.0%
Nonmarketed renewables⁹								
Geothermal heat pumps.....	0.01	0.01	0.02	0.02	0.02	0.03	0.04	3.7%
Solar hot water heating.....	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.9%
Solar photovoltaic.....	0.10	0.13	0.40	0.64	0.95	1.35	2.54	9.3%
Wind.....	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.8%
Total.....	0.15	0.18	0.46	0.70	1.02	1.42	2.62	8.4%
Heating degree days¹⁰.....	3,879	3,896	4,032	3,958	3,883	3,809	3,660	-0.2%
Cooling degree days¹⁰.....	1,557	1,399	1,541	1,594	1,649	1,704	1,817	0.8%

¹Does not include water heating portion of load.

²Includes televisions, set-top boxes, home theater systems, DVD players, and video game consoles.

³Includes desktop and laptop computers, monitors, and networking equipment.

⁴Includes small electric devices, heating elements, and motors not listed above. Electric vehicles are included in the transportation sector.

⁵Includes such appliances as outdoor grills, natural gas-fueled lights, pool heaters, spa heaters, and backup electricity generators.

⁶Includes such appliances as pool heaters, spa heaters, and backup electricity generators.

⁷Includes wood used for primary and secondary heating in wood stoves or fireplaces as reported in the *Residential Energy Consumption Survey 2009*.

⁸Includes small electric devices, heating elements, outdoor grills, natural gas-fueled lights, pool heaters, spa heaters, backup electricity generators, and motors not listed above. Electric vehicles are included in the transportation sector.

⁹Consumption determined by using the average electric power sector fossil-fuels net heat rate.

¹⁰See Table A5 for regional detail.

Btu = British thermal unit.

- - = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 consumption based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. 2016 degree days based on state-level data from the National Oceanic and Atmospheric Administration's Climatic Data Center and Climate Prediction Center. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A5. Commercial sector key indicators and consumption
(quadrillion Btu per year, unless otherwise noted)

Key indicators and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Key indicators								
Total floorspace (billion square feet)								
Surviving.....	87.8	88.7	97.0	102.1	107.5	112.8	123.6	1.0%
New additions.....	1.9	2.0	2.1	2.3	2.3	2.4	2.5	0.7%
Total.....	89.7	90.7	99.1	104.4	109.8	115.1	126.1	1.0%
Energy consumption intensity (thousand Btu per square foot)								
Delivered energy consumption.....	99.2	98.6	92.4	89.2	86.8	85.1	84.5	-0.5%
Electricity related losses.....	103.1	99.9	90.4	85.9	82.0	79.4	75.9	-0.8%
Total energy consumption.....	202.4	198.5	182.8	175.1	168.8	164.5	160.4	-0.6%
Delivered energy consumption by fuel								
Purchased electricity								
Space heating ¹	0.12	0.12	0.13	0.12	0.11	0.10	0.09	-0.8%
Space cooling ¹	0.56	0.49	0.50	0.50	0.50	0.51	0.54	0.3%
Water heating ¹	0.03	0.03	0.03	0.03	0.03	0.02	0.02	-0.7%
Ventilation.....	0.52	0.52	0.50	0.45	0.42	0.40	0.37	-1.0%
Cooking.....	0.08	0.08	0.08	0.07	0.07	0.07	0.07	-0.6%
Lighting.....	0.50	0.49	0.43	0.41	0.37	0.35	0.30	-1.5%
Refrigeration.....	0.64	0.65	0.65	0.66	0.67	0.69	0.74	0.4%
Computing.....	0.35	0.34	0.31	0.31	0.33	0.34	0.33	-0.1%
Office equipment.....	0.33	0.36	0.52	0.59	0.65	0.70	0.87	2.7%
Other uses ²	1.51	1.53	1.62	1.69	1.77	1.87	2.18	1.1%
Delivered energy.....	4.64	4.61	4.77	4.84	4.92	5.05	5.51	0.5%
Natural gas								
Space heating ¹	1.57	1.56	1.55	1.53	1.52	1.51	1.49	-0.1%
Space cooling ¹	0.03	0.03	0.02	0.02	0.02	0.02	0.02	-0.8%
Water heating ¹	0.57	0.58	0.57	0.59	0.60	0.62	0.65	0.3%
Cooking.....	0.32	0.33	0.35	0.38	0.40	0.42	0.47	1.1%
Other uses ³	0.73	0.77	0.84	0.91	1.01	1.13	1.46	2.0%
Delivered energy.....	3.22	3.26	3.34	3.42	3.56	3.71	4.09	0.7%
Distillate fuel oil								
Space heating ¹	0.24	0.24	0.21	0.20	0.19	0.18	0.17	-1.1%
Water heating ¹	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.6%
Other uses ⁴	0.11	0.12	0.14	0.14	0.14	0.14	0.15	0.6%
Delivered energy.....	0.35	0.37	0.36	0.35	0.34	0.33	0.32	-0.5%
Marketed renewables (biomass).....	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Other fuels ⁵	0.56	0.57	0.55	0.56	0.57	0.58	0.61	0.2%
Delivered energy consumption by end use								
Space heating ¹	1.93	1.93	1.89	1.85	1.82	1.79	1.75	-0.3%
Space cooling ¹	0.59	0.51	0.52	0.52	0.52	0.53	0.56	0.3%
Water heating ¹	0.61	0.61	0.61	0.62	0.64	0.65	0.67	0.3%
Ventilation.....	0.52	0.52	0.50	0.45	0.42	0.40	0.37	-1.0%
Cooking.....	0.40	0.41	0.43	0.45	0.48	0.50	0.54	0.8%
Lighting.....	0.50	0.49	0.43	0.41	0.37	0.35	0.30	-1.5%
Refrigeration.....	0.64	0.65	0.65	0.66	0.67	0.69	0.74	0.4%
Computing.....	0.35	0.34	0.31	0.31	0.33	0.34	0.33	-0.1%
Office equipment.....	0.33	0.36	0.52	0.59	0.65	0.70	0.87	2.7%
Other uses ⁶	3.04	3.13	3.29	3.44	3.63	3.86	4.53	1.1%
Delivered energy.....	8.91	8.94	9.15	9.31	9.53	9.80	10.66	0.5%

Table A5. Commercial sector key indicators and consumption (continued)
(quadrillion Btu per year, unless otherwise noted)

Key indicators and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Electricity related losses.....	9.26	9.06	8.96	8.97	9.01	9.14	9.57	0.2%
Total energy consumption by end use								
Space heating ¹	2.16	2.16	2.13	2.07	2.03	1.98	1.91	-0.4%
Space cooling ¹	1.70	1.47	1.46	1.44	1.43	1.44	1.49	0.0%
Water heating ¹	0.67	0.67	0.66	0.67	0.68	0.69	0.72	0.2%
Ventilation.....	1.55	1.53	1.43	1.28	1.18	1.11	1.03	-1.2%
Cooking.....	0.57	0.57	0.58	0.59	0.61	0.62	0.65	0.4%
Lighting.....	1.49	1.45	1.24	1.17	1.06	0.98	0.81	-1.7%
Refrigeration.....	1.92	1.92	1.88	1.89	1.91	1.94	2.02	0.2%
Computing.....	1.06	1.02	0.90	0.90	0.93	0.96	0.92	-0.3%
Office equipment.....	1.00	1.07	1.51	1.70	1.84	1.97	2.37	2.4%
Other uses ⁶	6.05	6.14	6.34	6.58	6.87	7.24	8.31	0.9%
Total.....	18.16	18.01	18.12	18.28	18.54	18.94	20.23	0.4%
Nonmarketed renewable fuels⁷								
Solar thermal.....	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.3%
Solar photovoltaic.....	0.09	0.11	0.22	0.28	0.36	0.46	0.67	5.7%
Wind.....	0.01	0.01	0.01	0.01	0.01	0.01	0.02	3.4%
Total.....	0.16	0.18	0.30	0.36	0.44	0.54	0.77	4.4%
Heating degree days								
New England.....	5,934	6,080	6,019	5,925	5,830	5,736	5,546	-0.3%
Middle Atlantic.....	5,363	5,345	5,432	5,351	5,271	5,191	5,030	-0.2%
East North Central.....	5,703	5,671	6,101	6,063	6,026	5,988	5,912	0.1%
West North Central.....	5,787	6,049	6,367	6,334	6,298	6,262	6,187	0.1%
South Atlantic.....	2,452	2,266	2,506	2,461	2,417	2,372	2,284	0.0%
East South Central.....	3,093	2,862	3,334	3,309	3,284	3,257	3,203	0.3%
West South Central.....	1,752	1,635	1,956	1,915	1,874	1,834	1,754	0.2%
Mountain.....	4,615	4,746	4,737	4,667	4,593	4,518	4,369	-0.3%
Pacific.....	3,033	3,401	3,237	3,189	3,140	3,090	2,989	-0.4%
United States.....	3,879	3,896	4,032	3,958	3,883	3,809	3,660	-0.2%
Cooling degree days								
New England.....	620	440	589	617	644	672	728	1.5%
Middle Atlantic.....	882	642	831	865	900	935	1,004	1.4%
East North Central.....	957	698	816	831	846	861	892	0.7%
West North Central.....	1,071	907	1,002	1,016	1,031	1,046	1,077	0.5%
South Atlantic.....	2,418	2,210	2,325	2,381	2,437	2,494	2,609	0.5%
East South Central.....	1,957	1,575	1,795	1,836	1,877	1,919	2,002	0.7%
West South Central.....	2,883	2,694	2,942	3,023	3,104	3,185	3,348	0.7%
Mountain.....	1,498	1,499	1,579	1,623	1,670	1,717	1,812	0.6%
Pacific.....	923	1,003	979	1,011	1,043	1,076	1,143	0.4%
United States.....	1,557	1,399	1,541	1,594	1,649	1,704	1,817	0.8%

¹Includes fuel consumption for district services.

²Includes (but is not limited to) miscellaneous uses such as transformers, medical imaging and other medical equipment, elevators, escalators, off-road electric vehicles, laboratory fume hoods, laundry equipment, coffee brewers, and water services.

³Includes miscellaneous uses, such as emergency generators, combined heat and power in commercial buildings, and manufacturing performed in commercial buildings.

⁴Includes miscellaneous uses, such as cooking, emergency generators, and combined heat and power in commercial buildings.

⁵Includes residual fuel oil, propane, coal, motor gasoline, and kerosene.

⁶Includes (but is not limited to) miscellaneous uses such as transformers, medical imaging and other medical equipment, elevators, escalators, off-road electric vehicles, laboratory fume hoods, laundry equipment, coffee brewers, water services, emergency generators, combined heat and power in commercial buildings, manufacturing performed in commercial buildings, and cooking (distillate), plus residual fuel oil, propane, coal, motor gasoline, kerosene, and marketed renewable fuels (biomass).

⁷Consumption determined by using the average electric power sector fossil-fuels net heat rate.

Btu = British thermal unit.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 consumption based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. 2016 degree days based on state-level data from the National Oceanic and Atmospheric Administration's Climatic Data Center and Climate Prediction Center. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A6. Industrial sector key indicators and consumption

Shipments, prices, and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Key indicators								
Value of shipments (billion 2009 dollars)								
Manufacturing	5,289	5,544	6,327	6,936	7,576	8,266	9,643	1.7%
Agriculture, mining, and construction	2,046	2,031	2,450	2,603	2,744	2,905	3,265	1.4%
Total	7,335	7,575	8,777	9,540	10,320	11,171	12,908	1.6%
Energy prices								
(2017 dollars per million Btu)								
Propane	11.67	12.42	13.48	14.01	15.11	16.06	17.77	1.1%
Motor gasoline	18.71	20.39	26.65	27.47	28.51	29.52	30.49	1.2%
Distillate fuel oil	13.74	16.01	21.86	23.11	24.36	25.51	25.88	1.5%
Residual fuel oil	5.00	6.67	13.36	14.43	15.37	16.27	16.96	2.9%
Asphalt and road oil	2.56	3.41	10.72	10.22	10.99	11.70	12.34	4.0%
Natural gas heat and power	3.45	3.96	4.95	5.09	5.10	5.34	5.91	1.2%
Natural gas feedstocks	3.49	3.94	4.90	5.04	5.05	5.29	5.84	1.2%
Metallurgical coal	4.30	4.24	4.57	4.65	4.75	4.83	5.13	0.6%
Other industrial coal	3.30	3.26	3.40	3.39	3.37	3.41	3.53	0.2%
Coal to liquids	--	--	--	--	--	--	--	--
Electricity	20.21	21.38	21.78	21.88	21.77	21.68	21.34	0.0%
(nominal dollars per million Btu)								
Propane	11.47	12.42	16.32	18.90	22.76	27.10	38.20	3.5%
Motor gasoline	18.38	20.39	32.27	37.08	42.94	49.80	65.53	3.6%
Distillate fuel oil	13.50	16.01	26.46	31.19	36.69	43.04	55.62	3.8%
Residual fuel oil	4.91	6.67	16.18	19.48	23.15	27.45	36.45	5.3%
Asphalt and road oil	2.51	3.41	12.98	13.80	16.56	19.75	26.52	6.4%
Natural gas heat and power	3.39	3.96	5.99	6.86	7.68	9.00	12.70	3.6%
Natural gas feedstocks	3.43	3.94	5.93	6.81	7.61	8.93	12.56	3.6%
Metallurgical coal	4.23	4.24	5.53	6.28	7.15	8.15	11.03	2.9%
Other industrial coal	3.24	3.26	4.12	4.57	5.08	5.75	7.58	2.6%
Coal to liquids	--	--	--	--	--	--	--	--
Electricity	19.86	21.38	26.36	29.52	32.79	36.58	45.86	2.3%
Energy consumption (quadrillion Btu)¹								
Industrial consumption excluding refining								
Propane heat and power	0.41	0.38	0.21	0.22	0.22	0.23	0.24	-1.4%
Liquefied petroleum gas and other feedstocks ² ..	2.27	2.35	3.37	3.64	3.77	3.89	3.91	1.6%
Motor gasoline	0.26	0.26	0.28	0.28	0.29	0.29	0.31	0.5%
Distillate fuel oil	1.14	1.16	1.30	1.35	1.38	1.44	1.57	0.9%
Residual fuel oil	0.04	0.04	0.03	0.03	0.03	0.04	0.04	-0.5%
Petrochemical feedstocks	0.64	0.71	1.05	1.17	1.24	1.30	1.32	1.9%
Petroleum coke	0.11	0.19	0.15	0.14	0.13	0.14	0.14	-0.9%
Asphalt and road oil	0.85	0.86	0.96	1.06	1.19	1.32	1.65	2.0%
Miscellaneous petroleum ³	0.37	0.37	0.37	0.38	0.37	0.37	0.37	0.0%
Petroleum and other liquids subtotal	6.10	6.33	7.72	8.27	8.62	9.01	9.55	1.3%
Natural gas heat and power	5.85	5.79	6.83	7.12	7.37	7.65	8.10	1.0%
Natural gas feedstocks	0.70	0.83	1.05	1.10	1.12	1.15	1.16	1.0%
Lease and plant fuel ⁴	1.65	1.67	2.06	2.14	2.17	2.24	2.31	1.0%
Natural gas to liquefy gas for export ⁵	0.02	0.07	0.48	0.55	0.55	0.55	0.55	6.5%
Natural gas subtotal	8.22	8.35	10.41	10.91	11.21	11.60	12.12	1.1%
Metallurgical coal and coke ⁶	0.45	0.51	0.42	0.45	0.49	0.50	0.50	-0.1%
Other industrial coal	0.67	0.62	0.72	0.70	0.67	0.66	0.67	0.2%
Coal subtotal	1.12	1.13	1.14	1.15	1.16	1.17	1.16	0.1%
Renewables ⁷	1.47	1.46	1.76	1.97	2.17	2.34	2.68	1.9%
Purchased electricity	3.00	3.03	3.55	3.71	3.79	3.91	4.06	0.9%
Delivered energy	19.90	20.30	24.59	26.01	26.95	28.03	29.58	1.1%
Electricity related losses	5.98	5.95	6.68	6.88	6.93	7.06	7.05	0.5%
Total	25.88	26.25	31.27	32.88	33.88	35.09	36.63	1.0%

Table A6. Industrial sector key indicators and consumption (continued)

Shipments, prices, and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Refining consumption								
Liquefied petroleum gas heat and power ²	0.01	0.01	0.00	0.00	0.00	0.00	0.00	--
Distillate fuel oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Residual fuel oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Petroleum coke	0.54	0.43	0.37	0.35	0.35	0.35	0.33	-0.8%
Still gas	1.49	1.56	1.72	1.70	1.75	1.76	1.72	0.3%
Miscellaneous petroleum ³	0.01	0.01	0.00	0.00	0.00	0.00	0.00	--
Petroleum and other liquids subtotal	2.05	2.00	2.09	2.05	2.10	2.10	2.04	0.1%
Natural gas heat and power	1.28	1.22	1.04	1.00	1.04	1.11	1.19	-0.1%
Natural gas feedstocks	0.18	0.22	0.25	0.25	0.28	0.31	0.36	1.4%
Natural-gas-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Natural gas subtotal	1.46	1.44	1.29	1.24	1.32	1.42	1.54	0.2%
Other industrial coal	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.8%
Coal-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Coal subtotal	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.8%
Biofuels heat and coproducts	0.83	0.82	0.86	0.86	0.86	0.86	0.83	0.0%
Purchased electricity	0.20	0.20	0.19	0.18	0.19	0.19	0.20	0.0%
Delivered energy	4.56	4.49	4.47	4.37	4.50	4.60	4.64	0.1%
Electricity related losses	0.40	0.39	0.36	0.34	0.35	0.35	0.35	-0.4%
Total	4.96	4.88	4.83	4.71	4.85	4.95	4.99	0.1%
Total industrial sector consumption								
Liquefied petroleum gas heat and power ²	0.41	0.39	0.21	0.22	0.22	0.23	0.24	-1.5%
Liquefied petroleum gas and other feedstocks ² ..	2.27	2.35	3.37	3.64	3.77	3.89	3.91	1.6%
Motor gasoline	0.26	0.26	0.28	0.28	0.29	0.29	0.31	0.5%
Distillate fuel oil	1.14	1.16	1.30	1.35	1.38	1.44	1.57	0.9%
Residual fuel oil	0.05	0.05	0.03	0.03	0.03	0.04	0.04	-0.6%
Petrochemical feedstocks	0.64	0.71	1.05	1.17	1.24	1.30	1.32	1.9%
Petroleum coke	0.65	0.62	0.52	0.50	0.49	0.48	0.46	-0.9%
Asphalt and road oil	0.85	0.86	0.96	1.06	1.19	1.32	1.65	2.0%
Still gas	1.49	1.56	1.72	1.70	1.75	1.76	1.72	0.3%
Miscellaneous petroleum ³	0.37	0.37	0.37	0.38	0.37	0.37	0.37	0.0%
Petroleum and other liquids subtotal	8.15	8.33	9.81	10.32	10.72	11.12	11.59	1.0%
Natural gas heat and power	7.13	7.01	7.87	8.12	8.41	8.76	9.28	0.9%
Natural gas feedstocks	0.88	1.05	1.30	1.34	1.40	1.46	1.52	1.1%
Natural-gas-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Lease and plant fuel ⁴	1.65	1.67	2.06	2.14	2.17	2.24	2.31	1.0%
Natural gas to liquefy gas for export ⁵	0.02	0.07	0.48	0.55	0.55	0.55	0.55	6.5%
Natural gas subtotal	9.68	9.80	11.71	12.15	12.53	13.02	13.67	1.0%
Metallurgical coal and coke ⁶	0.45	0.51	0.42	0.45	0.49	0.50	0.50	-0.1%
Other industrial coal	0.69	0.65	0.76	0.73	0.70	0.70	0.70	0.2%
Coal-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Coal subtotal	1.14	1.16	1.17	1.18	1.19	1.20	1.19	0.1%
Biofuels heat and coproducts	0.83	0.82	0.86	0.86	0.86	0.86	0.83	0.0%
Renewables ⁷	1.47	1.46	1.76	1.97	2.17	2.34	2.68	1.9%
Purchased electricity	3.19	3.23	3.75	3.89	3.98	4.10	4.26	0.8%
Delivered energy	24.46	24.78	29.06	30.38	31.45	32.63	34.22	1.0%
Electricity related losses	6.37	6.34	7.04	7.21	7.28	7.41	7.40	0.5%
Total	30.84	31.13	36.10	37.59	38.73	40.04	41.61	0.9%

Table A6. Industrial sector key indicators and consumption (continued)

Key indicators and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Energy consumption per dollar of shipments (thousand Btu per 2009 dollar)								
Petroleum and other liquids	1.11	1.10	1.12	1.08	1.04	1.00	0.90	-0.6%
Natural gas	1.32	1.29	1.33	1.27	1.21	1.17	1.06	-0.6%
Coal	0.16	0.15	0.13	0.12	0.12	0.11	0.09	-1.5%
Renewable fuels ⁷	0.31	0.30	0.30	0.30	0.29	0.29	0.27	-0.3%
Purchased electricity	0.44	0.43	0.43	0.41	0.39	0.37	0.33	-0.8%
Delivered energy	3.34	3.27	3.31	3.18	3.05	2.92	2.65	-0.6%
Industrial combined heat and power¹								
Capacity (gigawatts)	25.2	26.1	28.9	30.5	32.5	35.0	41.1	1.4%
Generation (billion kilowatthours).....	137	145	166	175	185	199	233	1.4%

¹Includes combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

²Includes ethane, natural gasoline, and refinery olefins.

³Includes lubricants and miscellaneous petroleum products.

⁴Represents natural gas used in well, field, and lease operations, and in natural gas processing plant machinery.

⁵Fuel used in facilities that liquefy natural gas for export.

⁶Includes net coal coke imports.

⁷Includes consumption of energy produced from hydroelectric, wood and wood waste, municipal waste, and other biomass sources.

Btu = British thermal unit.

-- = Not applicable.

Note: Includes estimated consumption for petroleum and other liquids. Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 prices for motor gasoline and distillate fuel oil are based on: U.S. Energy Information Administration (EIA), *Petroleum Marketing Monthly*, July 2017. 2016 petrochemical feedstock and asphalt and road oil prices are based on: EIA, *State Energy Data Report 2015*. 2016 coal prices are based on: EIA, *Quarterly Coal Report, October-December 2016* and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. 2016 electricity prices: EIA, *Monthly Energy Review*, September 2017. 2016 natural gas prices: *Natural Gas Monthly*, July 2017. 2016 refining consumption based on: *Petroleum Supply Annual 2016*, and EIA, *Refinery Capacity Report*, June 2017. Other 2016 consumption values are based on: EIA, *Monthly Energy Review*, September 2017. 2016 shipments: IHS Markit, Industry model, May 2017. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A7. Transportation sector key indicators and delivered energy consumption

Key indicators and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Key indicators								
Travel indicators								
(billion vehicle miles traveled)								
Light-duty vehicles less than 8,501 pounds	2,747	2,794	2,879	2,943	3,010	3,086	3,302	0.5%
Commercial light trucks ¹	96	99	110	118	126	134	153	1.3%
Freight trucks greater than 10,000 pounds	277	285	316	336	356	377	416	1.2%
Bus transportation.....	204	205	214	220	225	228	235	0.4%
Passenger rail.....	40	40	44	46	49	51	55	1.0%
(billion seat miles available)								
Air	1,087	1,105	1,342	1,511	1,689	1,873	2,287	2.2%
(billion ton miles traveled)								
Rail	1,696	1,745	1,879	1,945	1,984	2,061	2,225	0.7%
Domestic shipping	452	446	383	336	314	292	276	-1.4%
Energy efficiency indicators								
(miles per gallon)								
New light-duty vehicle CAFE standard ²	32.8	33.5	46.1	46.3	46.4	46.5	46.5	1.0%
New car ²	36.9	38.5	53.0	53.1	53.1	53.1	53.1	1.0%
New light truck ²	28.8	29.0	39.2	39.2	39.2	39.2	39.2	0.9%
Compliance new light-duty vehicle ³	33.2	33.4	46.9	47.8	48.3	48.5	48.6	1.1%
New car ³	38.5	38.6	54.5	55.4	56.2	56.7	56.8	1.2%
New light truck ³	28.3	28.9	39.6	40.0	40.0	39.8	39.9	1.0%
Tested new light-duty vehicle ⁴	32.5	32.9	46.9	47.7	48.2	48.5	48.5	1.2%
New car ⁴	38.1	38.2	54.5	55.4	56.2	56.7	56.8	1.2%
New light truck ⁴	27.5	28.3	39.6	39.9	40.0	39.8	39.8	1.0%
On-road new light-duty vehicle ⁵	26.3	26.6	37.9	38.6	39.0	39.2	39.3	1.2%
New car ⁵	31.1	31.2	44.5	45.3	45.9	46.3	46.4	1.2%
New light truck ⁵	22.0	22.6	31.7	32.0	32.0	31.9	31.9	1.0%
Light-duty stock ⁶	22.4	22.8	27.8	31.7	34.7	36.6	38.2	1.6%
New commercial light truck ¹	13.1	13.3	19.6	20.5	20.6	20.6	20.6	1.3%
Stock commercial light truck ¹	13.8	13.7	16.9	18.3	19.2	19.8	20.3	1.2%
Freight truck.....	7.0	7.1	8.1	8.9	9.7	10.1	10.4	1.2%
(seat miles per gallon)								
Aircraft	66.7	66.9	69.0	70.8	72.8	74.9	79.4	0.5%
(ton miles per thousand Btu)								
Rail	3.5	3.5	3.7	3.8	4.0	4.1	4.5	0.8%
Domestic shipping	4.9	5.0	5.4	5.6	5.9	6.2	6.8	0.9%
Energy use by mode								
(quadrillion Btu)								
Light-duty vehicles	15.35	15.34	12.92	11.59	10.84	10.54	10.83	-1.0%
Commercial light trucks ¹	0.88	0.90	0.82	0.81	0.82	0.85	0.94	0.1%
Bus transportation.....	0.23	0.23	0.24	0.25	0.25	0.25	0.25	0.2%
Freight trucks.....	5.48	5.59	5.55	5.38	5.31	5.43	5.97	0.2%
Rail, passenger.....	0.05	0.05	0.05	0.06	0.06	0.06	0.07	1.1%
Rail, freight	0.49	0.50	0.51	0.51	0.50	0.50	0.50	0.0%
Shipping, domestic	0.09	0.09	0.07	0.06	0.05	0.05	0.04	-2.4%
Shipping, international	1.03	1.03	1.04	1.03	1.02	1.00	0.98	-0.2%
Recreational boats.....	0.24	0.24	0.25	0.25	0.25	0.25	0.24	0.0%
Air	2.36	2.39	2.77	3.03	3.28	3.52	4.03	1.6%
Military use	0.55	0.55	0.55	0.57	0.61	0.65	0.75	0.9%
Lubricants	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.2%
Pipeline and distribution fuel.....	0.70	0.64	0.70	0.70	0.71	0.72	0.75	0.5%
Total	27.60	27.71	25.61	24.36	23.82	23.94	25.49	-0.3%

Table A7. Transportation sector key indicators and delivered energy consumption (continued)

Key indicators and consumption	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Energy use by mode								
(million barrels per day oil equivalent)								
Light-duty vehicles.....	8.31	8.31	7.05	6.33	5.92	5.75	5.89	-1.0%
Commercial light trucks ¹	0.46	0.47	0.43	0.43	0.44	0.45	0.50	0.2%
Bus transportation.....	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.2%
Freight trucks.....	2.64	2.69	2.68	2.60	2.56	2.63	2.89	0.2%
Rail, passenger.....	0.02	0.02	0.02	0.03	0.03	0.03	0.03	1.1%
Rail, freight.....	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.0%
Shipping, domestic.....	0.04	0.04	0.03	0.03	0.03	0.02	0.02	-2.4%
Shipping, international.....	0.46	0.46	0.47	0.46	0.46	0.45	0.44	-0.1%
Recreational boats.....	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Air.....	1.14	1.16	1.34	1.46	1.58	1.70	1.95	1.6%
Military use.....	0.26	0.27	0.26	0.27	0.29	0.31	0.36	0.9%
Lubricants.....	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.2%
Pipeline and distribution fuel.....	0.33	0.30	0.33	0.33	0.33	0.34	0.35	0.5%
Total.....	14.22	14.27	13.17	12.50	12.20	12.25	13.00	-0.3%

¹Commercial trucks 8,501 to 10,000 pounds gross vehicle weight rating.

²CAFE standard based on projected new vehicle sales.

³Includes CAFE credits for alternative fueled vehicle sales and credit banking.

⁴Environmental Protection Agency rated miles per gallon.

⁵Tested new vehicle efficiency revised for on-road performance.

⁶Combined "on-the-road" estimate for all cars and light trucks.

CAFE = Corporate average fuel economy.

Btu = British thermal unit.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017; EIA, Alternatives to Traditional Transportation Fuels 2009 (Part II - User and Fuel Data), April 2011; Federal Highway Administration, *Highway Statistics 2015*; Oak Ridge National Laboratory, *Transportation Energy Data Book: Edition 36*; National Highway Traffic and Safety Administration, *Summary of Fuel Economy Performance*, June 2015; U.S. Department of Commerce, Bureau of the Census, "Vehicle Inventory and Use Survey," EC02TV; U.S. Environmental Protection Agency, Engines and Vehicles Compliance Information System, various years; EIA, U.S. Department of Transportation, Research and Special Programs Administration, *Air Carrier Statistics Monthly, December 2010/2009*; and United States Department of Defense, Defense Logistics Agency Energy, Fiscal Year 2015 Fact Book. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A8. Electricity supply, disposition, prices, and emissions
(billion kilowatthours, unless otherwise noted)

Supply, disposition, prices, and emissions	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Net generation by fuel type								
Electric power sector¹								
Power only²								
Coal	1,216	1,237	1,155	1,168	1,140	1,137	1,139	-0.2%
Petroleum	21	17	12	10	9	9	7	-2.6%
Natural gas ³	1,150	1,004	1,173	1,244	1,281	1,350	1,515	1.3%
Nuclear power	804	792	719	696	669	666	635	-0.7%
Pumped storage/other ⁴	0	3	2	1	1	1	0	-5.3%
Renewable sources ⁵	573	625	866	911	1,029	1,099	1,241	2.1%
Distributed generation (natural gas)	0	0	1	2	3	3	7	--
Total	3,764	3,678	3,927	4,032	4,132	4,265	4,543	0.6%
Combined heat and power⁶								
Coal	14	20	17	17	17	17	17	-0.5%
Petroleum	2	1	1	1	1	1	1	0.0%
Natural gas	129	140	144	143	143	143	142	0.0%
Renewable sources	4	5	5	5	5	5	5	0.1%
Total	153	165	166	166	166	166	164	0.0%
Total net electric power sector generation.....	3,917	3,843	4,093	4,198	4,297	4,430	4,708	0.6%
Less direct use.....	17	17	17	17	17	17	17	-0.1%
Net available to the grid	3,900	3,826	4,077	4,181	4,280	4,414	4,691	0.6%
End-use sector⁷								
Coal	12	12	11	11	10	10	9	-0.9%
Petroleum	1	1	1	1	1	1	1	-1.2%
Natural gas	103	108	131	146	166	190	251	2.6%
Other gaseous fuels ⁸	12	15	20	20	20	21	21	1.0%
Renewable sources ⁹	53	61	106	139	184	243	405	5.9%
Other ¹⁰	2	2	3	3	3	3	3	0.2%
Total end-use sector net generation	184	199	270	319	384	466	689	3.8%
Less direct use.....	130	147	215	256	309	375	541	4.0%
Total sales to the grid.....	54	52	55	63	75	91	148	3.2%
Total net electricity generation by fuel								
Coal	1,242	1,268	1,183	1,196	1,167	1,164	1,165	-0.3%
Petroleum	24	19	13	11	10	10	8	-2.4%
Natural gas	1,383	1,252	1,449	1,535	1,593	1,686	1,914	1.3%
Nuclear power.....	804	792	719	696	669	666	635	-0.7%
Renewable sources ^{5,9}	630	691	976	1,055	1,219	1,347	1,651	2.7%
Other ¹¹	19	20	24	24	24	24	24	0.5%
Total net electricity generation.....	4,101	4,042	4,364	4,517	4,681	4,896	5,396	0.9%
Net generation to the grid.....	3,954	3,878	4,132	4,244	4,355	4,504	4,839	0.7%
Net imports.....	71	64	55	58	57	57	55	-0.5%
Electricity sales by sector								
Residential.....	1,407	1,374	1,389	1,409	1,434	1,470	1,545	0.4%
Commercial	1,360	1,351	1,397	1,417	1,443	1,481	1,615	0.5%
Industrial.....	936	946	1,098	1,140	1,166	1,202	1,248	0.8%
Transportation.....	10	11	39	65	93	119	167	8.5%
Total	3,713	3,681	3,924	4,032	4,135	4,272	4,575	0.7%
Direct use	147	164	232	272	326	392	558	3.8%
Total electricity use	3,860	3,845	4,156	4,304	4,461	4,664	5,132	0.9%

Table A8. Electricity supply, disposition, prices, and emissions (continued)
(billion kilowatthours, unless otherwise noted)

Supply, disposition, prices, and emissions	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
End-use prices								
(2017 cents per kilowatthour)								
Residential.....	12.8	12.7	13.8	14.0	14.1	14.1	13.9	0.3%
Commercial.....	10.7	10.7	11.2	11.3	11.3	11.2	10.8	0.0%
Industrial.....	6.9	7.3	7.4	7.5	7.4	7.4	7.3	0.0%
Transportation.....	9.9	10.6	13.4	13.8	13.8	13.5	12.8	0.6%
All sectors average.....	10.5	10.6	11.1	11.2	11.2	11.2	11.0	0.1%
(nominal cents per kilowatthour)								
Residential.....	12.6	12.7	16.8	19.0	21.2	23.8	29.9	2.6%
Commercial.....	10.5	10.7	13.6	15.3	17.0	18.9	23.3	2.4%
Industrial.....	6.8	7.3	9.0	10.1	11.2	12.5	15.6	2.3%
Transportation.....	9.7	10.6	16.2	18.7	20.8	22.8	27.6	2.9%
All sectors average.....	10.3	10.6	13.5	15.2	16.9	18.9	23.6	2.5%
Prices by service category								
(2017 cents per kilowatthour)								
Generation.....	6.5	6.3	6.1	6.0	5.8	5.7	5.6	-0.3%
Transmission.....	1.3	1.3	1.5	1.6	1.6	1.7	1.6	0.6%
Distribution.....	2.7	3.0	3.5	3.7	3.8	3.8	3.7	0.7%
(nominal cents per kilowatthour)								
Generation.....	6.4	6.3	7.4	8.0	8.7	9.7	12.1	2.0%
Transmission.....	1.3	1.3	1.8	2.1	2.4	2.8	3.5	3.0%
Distribution.....	2.6	3.0	4.3	5.0	5.7	6.4	8.0	3.0%
Electric power sector emissions¹								
Sulfur dioxide (million short tons).....	1.47	1.03	1.06	1.25	1.24	1.28	1.28	0.6%
Nitrogen oxide (million short tons).....	1.18	1.05	0.96	1.01	1.00	1.00	0.99	-0.2%
Mercury (short tons).....	4.92	4.99	4.60	4.69	4.56	4.48	4.43	-0.4%

¹Includes electricity-only and combined heat and power plants that have a regulatory status.

²Includes plants that only produce electricity and that have a regulatory status.

³Includes electricity generation from fuel cells.

⁴Includes non-biogenic municipal waste. The U.S. Energy Information Administration estimates that in 2017 approximately 7 billion kilowatthours of electricity were generated from a municipal waste stream containing petroleum-derived plastics and other non-renewable sources. See U.S. Energy Information Administration, *Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy*, (Washington, DC, May 2007).

⁵Includes conventional hydroelectric, geothermal, wood, wood waste, biogenic municipal waste, landfill gas, other biomass, solar, and wind power.

⁶Includes combined heat and power plants whose primary business is to sell electricity and heat to the public (i.e., those that report North American Industry Classification System code 22 or that have a regulatory status).

⁷Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors that have a non-regulatory status; and small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid.

⁸Includes refinery gas and still gas.

⁹Includes conventional hydroelectric, geothermal, wood, wood waste, all municipal waste, landfill gas, other biomass, solar, and wind power.

¹⁰Includes batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

¹¹Includes pumped storage, non-biogenic municipal waste, refinery gas, still gas, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 electric power sector generation; sales to the grid; net imports; electricity sales; and electricity end-use prices: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017, and supporting databases. 2016 emissions: U.S. Environmental Protection Agency, Clean Air Markets Database. 2016 electricity prices by service category: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. **Projections:** EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A9. Electricity generating capacity (gigawatts)

Net summer capacity ¹	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Electric power sector²								
Power only³								
Coal ⁴	260.0	254.3	196.1	190.0	188.6	188.0	188.0	-0.9%
Oil and natural gas steam ^{4,5}	89.0	83.9	57.3	55.0	51.9	48.6	44.7	-1.9%
Combined cycle.....	206.2	215.7	240.9	256.2	266.1	279.6	333.7	1.3%
Combustion turbine/diesel.....	140.1	139.5	153.0	157.8	163.3	174.8	217.0	1.3%
Nuclear power ⁶	99.3	99.3	89.8	87.0	83.5	83.1	79.1	-0.7%
Pumped storage.....	22.8	22.8	22.8	22.8	22.8	22.8	22.8	0.0%
Diurnal storage.....	0.5	0.6	15.2	26.9	33.7	35.4	39.7	13.3%
Fuel cells.....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1%
Renewable sources ⁷	190.7	203.9	274.6	287.8	331.7	355.6	407.5	2.1%
Distributed generation (natural gas) ⁸	0.0	0.0	0.9	1.5	2.3	4.1	11.5	--
Total	1,008.7	1,020.2	1,050.6	1,085.0	1,144.0	1,192.2	1,344.0	0.8%
Combined heat and power⁹								
Coal.....	3.7	3.2	2.7	2.7	2.7	2.7	2.7	-0.5%
Oil and natural gas steam ⁵	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6%
Combined cycle.....	24.7	25.0	24.9	24.9	24.9	24.9	24.9	0.0%
Combustion turbine/diesel.....	3.2	3.3	3.2	3.2	3.2	3.2	3.2	0.0%
Renewable sources ⁷	1.0	1.1	1.1	1.1	1.1	1.1	1.1	0.0%
Total	33.2	33.0	32.5	32.5	32.5	32.5	32.5	0.0%
Cumulative planned additions¹⁰								
Coal.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Oil and natural gas steam ⁵	--	--	0.3	0.3	0.3	0.3	0.3	--
Combined cycle.....	--	--	25.3	25.3	25.3	25.3	25.3	--
Combustion turbine/diesel.....	--	--	9.1	9.1	9.1	9.1	9.1	--
Nuclear power.....	--	--	2.2	2.2	2.2	2.2	2.2	--
Pumped storage.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Diurnal storage.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Fuel cells.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Renewable sources ⁷	--	--	21.8	21.8	21.8	21.8	21.8	--
Distributed generation ⁸	--	--	0.0	0.0	0.0	0.0	0.0	--
Total	--	--	58.8	58.8	58.8	58.8	58.8	--
Cumulative unplanned additions¹⁰								
Coal.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Oil and natural gas steam ⁵	--	--	0.0	0.0	0.0	0.0	0.0	--
Combined cycle.....	--	--	12.9	28.5	40.8	56.0	115.0	--
Combustion turbine/diesel.....	--	--	13.0	19.9	26.5	38.5	82.0	--
Nuclear power.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Pumped storage.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Diurnal storage.....	--	--	14.5	26.3	33.0	34.8	39.0	--
Fuel cells.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Renewable sources ⁷	--	--	49.0	62.2	106.1	130.0	181.9	--
Distributed generation ⁸	--	--	0.9	1.5	2.3	4.1	11.5	--
Total	--	--	90.2	138.4	208.8	263.4	429.4	--
Cumulative electric power sector additions¹⁰ ..	--	--	149.0	197.2	267.6	322.2	488.2	--
Cumulative retirements¹¹								
Coal.....	--	--	55.9	62.0	63.4	64.0	64.0	--
Oil and natural gas steam ⁵	--	--	29.5	31.9	35.0	38.2	42.2	--
Combined cycle.....	--	--	13.1	13.5	15.8	17.5	22.5	--
Combustion turbine/diesel.....	--	--	8.8	10.9	11.9	12.4	13.6	--
Nuclear power.....	--	--	13.3	16.7	20.8	22.2	26.2	--
Pumped storage.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Diurnal storage.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Fuel cells.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Renewable sources ⁷	--	--	0.2	0.2	0.2	0.2	0.2	--
Total	--	--	120.8	135.0	147.0	154.6	168.7	--
Total electric power sector capacity	1,041.8	1,053.2	1,083.1	1,117.5	1,176.5	1,224.7	1,376.5	0.8%

Table A9. Electricity generating capacity (continued)
(gigawatts)

Net summer capacity ¹	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
End-use generators¹²								
Coal	2.9	3.0	2.7	2.6	2.6	2.5	2.2	-0.9%
Petroleum	0.6	0.5	0.4	0.4	0.5	0.5	0.5	-0.5%
Natural gas	16.8	17.2	20.7	23.4	26.7	30.5	40.4	2.6%
Other gaseous fuels ¹³	2.8	3.0	3.0	3.0	3.0	3.1	3.1	0.1%
Renewable sources ⁷	23.6	28.4	60.6	83.5	114.9	154.1	262.2	7.0%
Other ¹⁴	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.2%
Total	47.0	52.6	88.0	113.5	148.2	191.1	308.9	5.5%
Cumulative capacity additions¹⁰	--	--	37.0	62.7	97.5	140.5	258.6	--

¹Net summer capacity is the steady hourly output that generating equipment is expected to supply to system load (exclusive of auxiliary power), as demonstrated by tests during summer peak demand.

²Includes electricity-only and combined heat and power plants that have a regulatory status.

³Includes plants that only produce electricity and that have a regulatory status. Includes capacity increases (uprates) at existing units.

⁴Total coal and oil and natural gas steam capacity account for the conversion of coal capacity to gas steam capacity, but the conversions are not included explicitly as additions or retirements. The totals reflect 1.1 gigawatts of planned conversions as well as additional model-projected conversions.

⁵Includes oil-, gas-, and dual-fired capacity.

⁶Nuclear capacity includes 3.8 gigawatts of uprates.

⁷Includes conventional hydroelectric, geothermal, wood, wood waste, all municipal waste, landfill gas, other biomass, solar, and wind power. Facilities co-firing biomass and coal are classified as coal.

⁸Primarily peak load capacity fueled by natural gas.

⁹Includes combined heat and power plants whose primary business is to sell electricity and heat to the public (i.e., those that report North American Industry Classification System code 22 or that have a regulatory status).

¹⁰Cumulative additions after December 31, 2017.

¹¹Cumulative retirements after December 31, 2017.

¹²Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors that have a non-regulatory status; and small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid.

¹³Includes refinery gas and still gas.

¹⁴Includes batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 capacity and projected planned additions: U.S. Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report" (preliminary). 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A10. Electricity trade
(billion kilowatthours, unless otherwise noted)

Electricity trade	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Interregional electricity trade								
Gross domestic sales								
Firm power.....	125	124	114	108	94	81	65	-1.9%
Economy.....	197	185	224	224	218	203	245	0.9%
Total	322	310	338	333	313	284	311	0.0%
Gross domestic sales (million 2017 dollars)								
Firm power.....	8,247	8,221	7,529	7,166	6,253	5,370	4,322	-1.9%
Economy.....	5,680	6,595	9,024	9,517	9,407	9,515	12,460	1.9%
Total	13,927	14,816	16,553	16,683	15,660	14,886	16,781	0.4%
International electricity trade								
Imports from Canada and Mexico								
Firm power.....	21.3	32.5	28.6	27.3	25.7	24.0	22.8	-1.1%
Economy.....	59.2	43.7	38.0	41.3	41.2	42.5	41.9	-0.1%
Total	80.4	76.2	66.6	68.6	66.9	66.5	64.7	-0.5%
Exports to Canada and Mexico								
Firm power.....	2.4	1.8	1.8	0.9	0.0	0.0	0.0	--
Economy.....	7.3	10.1	9.7	10.0	10.0	10.0	10.0	0.0%
Total	9.7	11.9	11.5	10.9	10.0	10.0	10.0	-0.5%

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports. Firm power sales are capacity sales, meaning the delivery of the power is scheduled as part of the normal operating conditions of the affected electric systems. Economy sales are subject to curtailment or cessation of delivery by the supplier in accordance with prior agreements or under specified conditions.

Sources: 2016 interregional firm electricity trade data: Federal Energy Regulatory Commission, Form 1, "Electric Utility Annual Report", and 2014 seasonal reliability assessments from North American Electric Reliability Council regional entities and Independent System Operators. 2016 interregional economy electricity trade data are model results. 2016 Mexican electricity trade data: U.S. Energy Information Administration (EIA), *Electric Power Annual 2016*. 2016 Canadian international electricity trade data: National Energy Board, *Electricity Exports and Imports Statistics, 2016*. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A11. Petroleum and other liquids supply and disposition
(million barrels per day, unless otherwise noted)

Supply and disposition	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Crude oil								
Domestic crude production ¹	8.90	9.24	11.38	11.70	11.85	11.90	11.30	0.6%
Alaska.....	0.49	0.48	0.54	0.60	0.55	0.52	0.30	-1.5%
Lower 48 states.....	8.42	8.76	10.84	11.10	11.30	11.38	11.00	0.7%
Net imports.....	7.26	6.85	6.00	5.44	5.58	5.69	5.91	-0.4%
Gross imports.....	7.85	7.82	6.94	6.60	6.82	6.83	7.06	-0.3%
Exports.....	0.59	0.97	0.93	1.15	1.24	1.13	1.15	0.5%
Other crude supply ²	0.07	0.33	0.07	0.00	0.00	0.00	0.00	--
Total crude supply.....	16.23	16.42	17.46	17.14	17.43	17.59	17.21	0.1%
Net product imports.....	-2.46	-2.64	-5.32	-5.57	-6.15	-6.21	-5.14	2.0%
Gross refined product imports ³	0.88	1.62	1.10	1.05	1.12	1.23	1.29	-0.7%
Unfinished oil imports.....	0.61	0.58	0.54	0.50	0.46	0.41	0.33	-1.7%
Blending component imports.....	0.66	0.65	0.50	0.31	0.17	0.17	0.16	-4.1%
Exports.....	4.59	5.49	7.46	7.43	7.89	8.03	6.93	0.7%
Refinery processing gain ⁴	1.12	1.10	1.01	0.96	1.00	1.01	1.01	-0.2%
Product stock withdrawal.....	-0.03	0.10	0.00	0.00	0.00	0.00	0.00	--
Natural gas plant liquids.....	3.48	3.73	5.13	5.35	5.43	5.47	5.57	1.2%
Supply from renewable sources.....	1.08	1.10	1.11	1.07	1.05	1.05	1.07	-0.1%
Ethanol.....	0.90	0.92	0.90	0.84	0.80	0.80	0.85	-0.2%
Domestic production.....	0.98	1.00	0.98	0.94	0.91	0.90	0.95	-0.2%
Net imports.....	-0.07	-0.08	-0.08	-0.10	-0.11	-0.11	-0.09	0.4%
Stock withdrawal.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Biodiesel.....	0.16	0.16	0.15	0.15	0.15	0.16	0.16	--
Domestic production.....	0.10	0.10	0.08	0.08	0.08	0.08	0.08	-0.8%
Net imports.....	0.06	0.05	0.07	0.07	0.07	0.07	0.08	1.2%
Stock withdrawal.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Other biomass-derived liquids ⁵	0.02	0.03	0.05	0.08	0.10	0.10	0.06	2.4%
Domestic production.....	0.02	0.03	0.05	0.08	0.10	0.10	0.06	2.4%
Net imports.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Stock withdrawal.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Liquids from gas.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Liquids from coal.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Other ⁶	0.22	0.23	0.27	0.26	0.28	0.29	0.31	0.9%
Total primary supply⁷.....	19.64	20.03	19.64	19.21	19.04	19.20	20.01	0.0%
Product supplied								
by fuel								
Liquefied petroleum gases and other ⁸	2.49	2.62	3.34	3.56	3.66	3.76	3.79	1.1%
Motor gasoline ⁹	9.32	9.32	8.00	7.21	6.75	6.56	6.75	-1.0%
of which: E85 ¹⁰	0.01	0.01	0.15	0.19	0.20	0.21	0.11	8.8%
Jet fuel ¹¹	1.61	1.66	1.85	2.01	2.17	2.33	2.66	1.4%
Distillate fuel oil ¹²	3.88	3.95	3.98	3.88	3.83	3.86	4.02	0.1%
of which: Diesel.....	3.70	3.76	3.56	3.48	3.44	3.49	3.65	-0.1%
Residual fuel oil.....	0.33	0.33	0.36	0.34	0.33	0.31	0.29	-0.3%
Other ¹³	2.01	2.01	2.15	2.24	2.33	2.42	2.55	0.7%
by sector								
Residential and commercial.....	1.00	1.07	0.95	0.92	0.89	0.87	0.84	-0.7%
Industrial ¹⁴	4.60	4.72	5.77	6.11	6.34	6.56	6.78	1.1%
Transportation.....	13.82	13.90	12.64	11.88	11.49	11.44	12.01	-0.4%
Electric power ¹⁵	0.11	0.09	0.06	0.05	0.05	0.05	0.04	-2.3%
Unspecified sector ¹⁶	0.07	0.07	0.24	0.27	0.29	0.32	0.37	5.1%
Total product supplied.....	19.64	19.89	19.67	19.23	19.07	19.24	20.05	0.0%
Discrepancy ¹⁷	0.00	0.13	-0.03	-0.03	-0.03	-0.03	-0.04	--

Table A11. Petroleum and other liquids supply and disposition (continued)
(million barrels per day, unless otherwise noted)

Supply and disposition	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Domestic refinery distillation capacity ¹⁸	18.4	18.6	19.5	19.5	19.5	19.5	19.5	0.2%
Capacity utilization rate (percent) ¹⁹	89.7	90.0	91.1	89.4	90.7	91.4	89.2	0.0%
Total gross imports	10.05	10.73	9.19	8.58	8.67	8.76	8.98	-0.5%
Total gross exports	5.26	6.56	8.52	8.74	9.28	9.31	8.23	0.7%
Total net imports	4.79	4.18	0.67	-0.17	-0.61	-0.55	0.75	-5.1%
Net import share of product supplied (percent)	24.4	20.9	3.4	-0.9	-3.2	-2.8	3.7	-5.1%
Expenditures for imported crude oil and petroleum products (billion 2017 dollars)	110	124	215	213	233	250	274	2.4%

¹Includes lease condensate.

²Strategic petroleum reserve stock additions plus unaccounted for crude oil and crude oil stock withdrawals.

³Includes other hydrocarbons and alcohols.

⁴The volumetric amount by which total output is greater than input due to the processing of crude oil into products which, in total, have a lower specific gravity than the crude oil processed.

⁵Includes pyrolysis oils, biomass-derived Fischer-Tropsch liquids, biobutanol, and renewable feedstocks used for the on-site production of diesel and gasoline.

⁶Includes domestic sources of other blending components, other hydrocarbons, and ethers.

⁷Total crude supply, net product imports, refinery processing gain, product stock withdrawal, natural gas plant liquids, supply from renewable sources, liquids from gas, liquids from coal, and other supply.

⁸Includes ethane, natural gasoline, and refinery olefins.

⁹Includes ethanol and ethers blended into gasoline.

¹⁰E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). To address cold starting issues, the percentage of ethanol varies seasonally. The annual average ethanol content of 74 percent is used for these projections.

¹¹Includes only kerosene type.

¹²Includes distillate fuel oil from petroleum and biomass feedstocks.

¹³Includes kerosene, aviation gasoline, petrochemical feedstocks, lubricants, waxes, asphalt, road oil, still gas, special naphthas, petroleum coke, crude oil product supplied, methanol, and miscellaneous petroleum products.

¹⁴Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

¹⁵Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.

¹⁶Represents consumption unattributed to the sectors above.

¹⁷Balancing item. Includes unaccounted for supply, losses, and gains.

¹⁸End-of-year operable capacity.

¹⁹Rate is calculated by dividing the gross annual input to atmospheric crude oil distillation units by their operable refining capacity in barrels per calendar day.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 product supplied based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. Other 2016 data: EIA, *Petroleum Supply Annual 2014*. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A12. Petroleum and other liquids prices
(2017 dollars per gallon, unless otherwise noted)

Sector and fuel	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Crude oil prices (2017 dollars per barrel)								
Brent spot	45	52	86	93	100	106	114	2.4%
West Texas Intermediate spot	44	50	82	89	95	101	110	2.4%
Average imported refiners acquisition cost ¹	39	47	77	81	87	94	100	2.3%
Brent / West Texas Intermediate spread	0	3	3	4	5	5	4	1.2%
Delivered sector product prices								
Residential								
Propane	1.51	1.58	1.69	1.74	1.84	1.92	2.08	0.8%
Distillate fuel oil	2.15	2.50	3.65	3.82	3.99	4.15	4.20	1.6%
Commercial								
Distillate fuel oil	1.89	2.21	3.05	3.21	3.38	3.54	3.59	1.5%
Residual fuel oil	0.79	1.05	1.75	1.91	2.06	2.19	2.31	2.4%
Residual fuel oil (2017 dollars per barrel)	33	44	73	80	86	92	97	2.4%
Industrial²								
Propane	1.07	1.13	1.23	1.28	1.38	1.47	1.62	1.1%
Distillate fuel oil	1.89	2.20	3.00	3.18	3.35	3.51	3.56	1.5%
Residual fuel oil	0.75	1.00	2.00	2.16	2.30	2.44	2.54	2.9%
Residual fuel oil (2017 dollars per barrel)	31	42	84	91	97	102	107	2.9%
Transportation								
Propane	1.62	1.69	1.83	1.88	1.98	2.06	2.21	0.8%
E85 ³	1.98	2.12	2.47	2.30	2.31	2.45	3.16	1.2%
Ethanol wholesale price	1.48	1.43	2.56	2.51	2.31	2.33	2.38	1.6%
Motor gasoline ⁴	2.30	2.50	3.25	3.34	3.46	3.57	3.67	1.2%
Jet fuel ⁵	1.35	1.61	2.56	2.74	2.93	3.12	3.30	2.2%
Diesel fuel (distillate fuel oil) ⁶	2.37	2.65	3.55	3.73	3.90	4.05	4.09	1.3%
Residual fuel oil	0.94	1.25	1.95	2.13	2.27	2.40	2.49	2.1%
Residual fuel oil (2017 dollars per barrel)	39	53	82	89	95	101	105	2.1%
Electric power⁷								
Distillate fuel oil	1.67	1.94	2.88	2.99	3.14	3.30	3.41	1.7%
Residual fuel oil	1.24	1.58	2.25	2.39	2.53	2.62	2.62	1.6%
Residual fuel oil (2017 dollars per barrel)	52	66	95	101	106	110	110	1.6%
Average prices, all sectors⁸								
Propane	1.31	1.39	1.53	1.57	1.66	1.74	1.88	0.9%
Motor gasoline ⁴	2.30	2.50	3.25	3.34	3.46	3.57	3.67	1.2%
Jet fuel ⁵	1.35	1.61	2.56	2.74	2.93	3.12	3.30	2.2%
Distillate fuel oil	2.26	2.55	3.44	3.61	3.78	3.93	3.96	1.3%
Residual fuel oil	0.99	1.27	1.96	2.13	2.27	2.40	2.49	2.0%
Residual fuel oil (2017 dollars per barrel)	42	53	82	89	95	101	104	2.0%
Average	1.93	2.13	2.67	2.73	2.82	2.93	3.05	1.1%

Table A12. Petroleum and other liquids prices (continued)
(nominal dollars per gallon, unless otherwise noted)

Sector and fuel	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Crude oil prices (nominal dollars per barrel)								
Brent spot	44	52	104	125	150	179	244	4.8%
West Texas Intermediate spot	43	50	100	120	143	171	235	4.8%
Average imported refiners acquisition cost ¹	39	47	93	110	131	158	214	4.7%
Delivered sector product prices								
Residential								
Propane	1.49	1.58	2.05	2.35	2.77	3.25	4.46	3.2%
Distillate fuel oil	2.11	2.50	4.42	5.15	6.01	7.00	9.03	4.0%
Commercial								
Distillate fuel oil	1.86	2.21	3.69	4.34	5.10	5.97	7.71	3.9%
Residual fuel oil	0.78	1.05	2.11	2.58	3.10	3.70	4.97	4.8%
Residual fuel oil (nominal dollars per barrel)	33	44	89	108	130	156	209	4.8%
Industrial²								
Propane	1.05	1.13	1.49	1.73	2.08	2.48	3.49	3.5%
Distillate fuel oil	1.86	2.20	3.64	4.29	5.04	5.92	7.64	3.8%
Residual fuel oil	0.73	1.00	2.42	2.92	3.47	4.11	5.46	5.3%
Residual fuel oil (nominal dollars per barrel)	31	42	102	122	146	173	229	5.3%
Transportation								
Propane	1.59	1.69	2.22	2.54	2.98	3.48	4.75	3.2%
E85 ³	1.95	2.12	2.99	3.10	3.48	4.13	6.79	3.6%
Ethanol wholesale price	1.45	1.43	3.10	3.39	3.49	3.93	5.12	3.9%
Motor gasoline ⁴	2.26	2.50	3.93	4.51	5.20	6.03	7.90	3.5%
Jet fuel ⁵	1.32	1.61	3.10	3.70	4.42	5.26	7.08	4.6%
Diesel fuel (distillate fuel oil) ⁶	2.33	2.65	4.30	5.03	5.88	6.84	8.78	3.7%
Residual fuel oil	0.92	1.25	2.37	2.87	3.42	4.05	5.36	4.5%
Residual fuel oil (nominal dollars per barrel)	39	53	99	121	144	170	225	4.5%
Electric power⁷								
Distillate fuel oil	1.64	1.94	3.48	4.03	4.74	5.57	7.32	4.1%
Residual fuel oil	1.22	1.58	2.73	3.23	3.81	4.43	5.63	3.9%
Residual fuel oil (nominal dollars per barrel)	51	66	114	136	160	186	237	3.9%
Average prices, all sectors⁸								
Propane	1.28	1.39	1.85	2.12	2.51	2.94	4.04	3.3%
Motor gasoline ⁴	2.26	2.50	3.93	4.51	5.21	6.03	7.90	3.5%
Jet fuel ⁵	1.32	1.61	3.10	3.70	4.42	5.26	7.08	4.6%
Distillate fuel oil	2.22	2.55	4.16	4.88	5.69	6.63	8.52	3.7%
Residual fuel oil	0.97	1.27	2.37	2.88	3.42	4.05	5.34	4.4%
Residual fuel oil (nominal dollars per barrel)	40.83	53.44	99.65	120.77	143.61	169.90	224.32	4.4%
Average	1.89	2.13	3.24	3.68	4.25	4.95	6.56	3.5%

¹Weighted average price delivered to U.S. refiners.

²Includes combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

³E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). To address cold starting issues, the percentage of ethanol varies seasonally. The annual average ethanol content of 74 percent is used for these projections.

⁴Sales weighted-average price for all grades. Includes Federal, State, and local taxes.

⁵Includes only kerosene type.

⁶Diesel fuel for on-road use. Includes Federal and State taxes while excluding county and local taxes.

⁷Includes electricity-only and combined heat and power plants that have a regulatory status.

⁸Weighted averages of end-use fuel prices are derived from the prices in each sector and the corresponding sectoral consumption.

Note: Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 Brent and West Texas Intermediate crude oil spot prices: Thomson Reuters. 2016 average imported crude oil price: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. 2016 prices for motor gasoline, distillate fuel oil, and jet fuel are based on: EIA, *Petroleum Marketing Monthly*, July 2017. 2016 residential, commercial, industrial, and transportation sector petroleum product prices are derived from: EIA, Form EIA-782A, "Refiners/Gas Plant Operators' Monthly Petroleum Product Sales Report." 2016 electric power prices based on: EIA, *Monthly Energy Review*, September 2017. 2016 E85 prices derived from monthly prices in the Clean Cities Alternative Fuel Price Report. 2016 wholesale ethanol prices derived from Oil Price Information Service, Chicago average spot price. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. **Projections:** EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A13. Natural gas supply, disposition, and prices
(trillion cubic feet, unless otherwise noted)

Supply, disposition, and prices	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Supply								
Dry gas production ¹	26.94	27.10	35.79	37.83	38.72	40.15	42.98	1.4%
Supplemental natural gas ²	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.2%
Net imports	0.69	-0.09	-5.89	-6.99	-7.19	-7.57	-8.40	14.7%
Pipeline ³	0.79	0.50	-1.34	-1.71	-1.91	-2.29	-3.12	-
Liquefied natural gas	-0.10	-0.59	-4.55	-5.28	-5.28	-5.28	-5.28	6.9%
Total supply	27.69	27.06	29.96	30.89	31.59	32.64	34.64	0.8%
Consumption by sector.....	27.50	26.68	29.78	30.72	31.42	32.47	34.48	0.8%
Residential.....	4.35	4.38	4.58	4.57	4.55	4.52	4.54	0.1%
Commercial	3.11	3.15	3.22	3.30	3.44	3.58	3.94	0.7%
Industrial ⁴	9.33	9.45	11.29	11.72	12.09	12.55	13.18	1.0%
Other industrial ⁴	7.72	7.77	8.84	9.12	9.46	9.86	10.41	0.9%
Lease and plant fuel ⁵	1.59	1.61	1.99	2.06	2.09	2.16	2.23	1.0%
Fuel used to liquefy gas for export ⁶	0.02	0.07	0.46	0.54	0.54	0.54	0.54	6.5%
Natural-gas-to-liquids heat and power ⁷	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Natural gas to liquids production ⁸	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Transportation.....	0.75	0.69	0.87	0.95	1.04	1.14	1.38	2.1%
Motor vehicles, trains, and ships.....	0.07	0.08	0.20	0.27	0.35	0.44	0.66	6.6%
Pipeline and distribution fuel.....	0.68	0.61	0.68	0.68	0.68	0.69	0.72	0.5%
Electric power ⁹	9.97	9.02	9.82	10.17	10.30	10.69	11.44	0.7%
Discrepancy¹⁰.....	0.18	0.38	0.18	0.17	0.17	0.17	0.16	-
Natural gas spot price at Henry Hub								
(2017 dollars per million Btu)	2.57	3.05	4.07	4.26	4.26	4.50	5.01	1.5%
(nominal dollars per million Btu).....	2.53	3.05	4.93	5.75	6.41	7.59	10.78	3.9%
Delivered prices								
(2017 dollars per thousand cubic feet)								
Residential.....	10.30	11.17	12.46	12.74	12.94	13.28	13.99	0.7%
Commercial.....	7.50	8.11	9.81	9.96	10.04	10.27	10.84	0.9%
Industrial ¹¹	3.60	4.10	5.10	5.25	5.26	5.51	6.09	1.2%
Transportation ¹²	14.81	14.99	14.32	13.65	13.20	13.18	13.59	-0.3%
Electric power ⁷	3.03	3.58	4.63	4.78	4.77	5.03	5.60	1.4%
Average¹³.....	5.04	5.73	6.83	6.98	7.01	7.24	7.83	0.9%
(nominal dollars per thousand cubic feet)								
Residential.....	10.12	11.17	15.08	17.19	19.49	22.40	30.06	3.0%
Commercial.....	7.37	8.11	11.88	13.45	15.13	17.32	23.29	3.2%
Industrial ¹¹	3.54	4.10	6.18	7.09	7.93	9.29	13.10	3.6%
Transportation ¹²	14.55	14.99	17.34	18.43	19.88	22.24	29.21	2.0%
Electric power ⁷	2.98	3.58	5.60	6.45	7.19	8.49	12.04	3.7%
Average¹³.....	4.96	5.73	8.27	9.41	10.56	12.22	16.83	3.3%

¹Marketed production (wet) minus extraction losses.
²Synthetic natural gas, propane air, coke oven gas, refinery gas, biomass gas, air injected for Btu stabilization, and manufactured gas commingled and distributed with natural gas.
³Natural gas imported from Canada and Mexico.
⁴Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems.
⁵Represents natural gas used in well, field, and lease operations, in natural gas processing plant machinery, and for liquefaction in export facilities.
⁶Fuel used in facilities that liquefy natural gas for export.
⁷Includes any natural gas used in the process of converting natural gas to liquid fuel that is not actually converted.
⁸Includes any natural gas converted into liquid fuel.
⁹Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.
¹⁰Balancing item. Natural gas lost as a result of converting flow data measured at varying temperatures and pressures to a standard temperature and pressure and the merger of different data reporting systems which vary in scope, format, definition, and respondent type. In addition, 2017 values include net storage injections.
¹¹Excludes use for lease and plant fuel and fuel used for liquefaction in export facilities.
¹²Natural gas used as fuel in motor vehicles, trains, and ships. Price includes estimated motor vehicle fuel taxes and estimated dispensing costs or charges.
¹³Weighted average prices. Weights used are the sectoral consumption values excluding lease, plant, pipeline and distribution fuel, and fuel used for liquefaction in export facilities.
- = Not applicable.
Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.
Sources: 2016 supply values: lease, plant, and pipeline fuel consumption; and residential and commercial delivered prices: U.S. Energy Information Administration (EIA), *Natural Gas Annual 2016*. 2016 industrial delivered prices derived from: EIA, *Manufacturing Energy Consumption Survey, 2002-2014*. Other 2016 consumption based on: EIA, *Monthly Energy Review*, September 2017. 2016 natural gas spot price at Henry Hub: Thomson Reuters. 2016 electric power prices: EIA, *Electric Power Monthly*, July 2017, Table 4.13.B; and EIA, *State Energy Data Report 2015*. 2016 transportation sector delivered prices are model results. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A14. Oil and gas supply

Production and supply	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Crude oil								
Lower 48 average wellhead price¹ (2017 dollars per barrel).....	39	50	82	89	95	101	109	2.4%
Production (million barrels per day)²								
United States total	8.90	9.24	11.38	11.70	11.85	11.90	11.30	0.6%
Lower 48 onshore	6.75	6.98	8.94	9.54	9.83	9.90	9.54	0.9%
Tight oil ³	4.56	4.97	7.01	7.61	7.98	8.14	7.92	1.4%
Carbon dioxide enhanced oil recovery.....	0.31	0.30	0.38	0.42	0.36	0.26	0.20	-1.3%
Other.....	1.88	1.71	1.55	1.52	1.49	1.49	1.42	-0.6%
Lower 48 offshore	1.67	1.77	1.90	1.56	1.47	1.48	1.47	-0.6%
State	0.07	0.07	0.04	0.04	0.03	0.03	0.02	-3.2%
Federal	1.60	1.71	1.86	1.52	1.44	1.45	1.45	-0.5%
Alaska.....	0.49	0.48	0.54	0.60	0.55	0.52	0.30	-1.5%
Onshore.....	0.39	0.41	0.38	0.34	0.30	0.29	0.17	-2.6%
State offshore	0.10	0.07	0.16	0.24	0.22	0.20	0.12	1.5%
Federal offshore.....	0.00	0.00	0.00	0.01	0.04	0.02	0.01	1.9%
Natural gas plant liquids production (million barrels per day)								
United States total	3.48	3.73	5.16	5.34	5.42	5.46	5.57	1.2%
Lower 48 onshore	3.12	3.27	4.79	5.02	5.10	5.14	5.26	1.5%
Lower 48 offshore	0.33	0.43	0.31	0.26	0.26	0.27	0.28	-1.3%
Alaska.....	0.03	0.03	0.05	0.06	0.06	0.05	0.03	-0.4%
Natural gas								
Natural gas spot price at Henry Hub (2017 dollars per million Btu).....	2.57	3.05	4.07	4.26	4.26	4.50	5.01	1.5%
Dry production (trillion cubic feet)⁴								
United States total	26.94	27.10	35.79	37.83	38.72	40.15	42.98	1.4%
Lower 48 onshore	25.37	25.49	34.38	36.56	37.39	38.68	41.46	1.5%
Tight gas	5.44	5.30	5.37	5.16	5.00	4.99	5.33	0.0%
Shale gas and tight oil plays ³	14.24	14.77	24.09	26.87	28.24	29.77	32.70	2.4%
Coalbed methane	1.00	0.90	0.78	0.71	0.64	0.60	0.50	-1.7%
Other.....	4.69	4.53	4.13	3.82	3.51	3.31	2.93	-1.3%
Lower 48 offshore	1.26	1.29	1.08	0.94	1.00	1.15	1.21	-0.2%
State	0.12	0.10	0.04	0.03	0.02	0.02	0.01	-5.8%
Federal	1.14	1.19	1.04	0.91	0.98	1.13	1.20	0.0%
Alaska.....	0.30	0.32	0.32	0.33	0.33	0.33	0.31	0.0%
Supplemental gas supplies (trillion cubic feet)⁵	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.2%
Total lower 48 wells drilled (thousands).....	14.4	25.6	29.7	31.6	33.1	34.0	34.4	0.9%

¹Represents lower 48 onshore and offshore supplies.

²Includes lease condensate.

³Tight oil represents resources in low-permeability reservoirs, including shale and chalk formations. The specific plays included in the tight oil category are Bakken/Three Forks/Sanish, Eagle Ford, Woodford, Austin Chalk, Spraberry, Niobrara, Avalon/Bone Springs, and Monterey.

⁴Marketed production (wet) minus extraction losses.

⁵Synthetic natural gas, propane air, coke oven gas, refinery gas, biomass gas, air injected for Btu stabilization, and manufactured gas commingled and distributed with natural gas.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 crude oil lower 48 average wellhead price: U.S. Energy Information Administration (EIA), *Petroleum Marketing Monthly*, July 2017. 2016 lower 48 onshore, lower 48 offshore, and Alaska crude oil production: EIA, *Petroleum Supply Monthly*, July 2017. 2016 natural gas spot price at Henry Hub: Thomson Reuters. 2016 Alaska and total natural gas production: EIA, *Natural Gas Monthly*, July 2017. 2016 supplemental gas supplies: EIA, *Natural Gas Annual 2016*. Other 2016 values: EIA, Office of Energy Analysis. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A15. Coal supply, disposition, and prices
(million short tons, unless otherwise noted)

Supply, disposition, and prices	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Production¹								
Appalachia.....	183	196	155	151	151	152	138	-1.1%
Interior.....	147	150	188	206	212	228	240	1.4%
West.....	411	438	395	393	373	366	368	-0.5%
East of the Mississippi.....	293	314	311	323	328	345	344	0.3%
West of the Mississippi.....	448	470	428	427	409	401	403	-0.5%
Total.....	741	784	738	750	736	746	747	-0.1%
Waste coal supplied².....	9	9	9	9	9	9	9	0.0%
Net imports								
Imports ³	10	9	4	2	2	2	2	-4.4%
Exports.....	60	75	67	69	73	86	85	0.4%
Total.....	-50	-66	-64	-67	-71	-84	-83	0.7%
Total supply⁴.....	700	727	684	692	674	671	673	-0.2%
Consumption by sector								
Commercial and institutional.....	1	1	2	2	2	2	2	2.1%
Coke plants.....	16	18	16	16	18	18	18	-0.1%
Other industrial ⁵	35	33	39	38	36	36	36	0.3%
Coal-to-liquids heat and power.....	0	0	0	0	0	0	0	--
Coal to liquids production.....	0	0	0	0	0	0	0	--
Electric power ⁶	679	676	630	638	621	617	619	-0.3%
Total.....	731	728	686	694	676	673	674	-0.2%
Discrepancy and stock change⁷.....	-31	-1	-2	-2	-2	-2	-2	--
Average minemouth price⁸								
(2017 dollars per short ton).....	33.0	32.9	34.0	35.0	36.6	38.7	39.8	0.6%
(2017 dollars per million Btu).....	1.65	1.63	1.69	1.75	1.82	1.91	1.97	0.6%
Delivered prices⁹								
(2017 dollars per short ton)								
Commercial and institutional.....	87.3	84.9	82.5	84.9	85.3	86.6	88.7	0.1%
Coke plants.....	120.4	118.3	129.6	132.1	134.9	137.3	145.9	0.6%
Other industrial ⁵	68.6	67.7	70.9	70.5	70.0	70.7	73.3	0.2%
Coal to liquids.....	--	--	--	--	--	--	--	--
Electric power ⁶								
(2017 dollars per short ton).....	42.1	41.3	43.6	44.2	45.1	46.5	47.4	0.4%
(2017 dollars per million Btu).....	2.20	2.15	2.28	2.31	2.35	2.41	2.46	0.4%
Average.....	45.3	44.6	47.2	47.8	48.9	50.3	51.6	0.4%
Exports ¹⁰	84.0	79.0	80.3	77.5	79.2	83.2	86.7	0.3%

Table A15. Coal supply, disposition, and prices (continued)
(million short tons, unless otherwise noted)

Supply, disposition, and prices	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Average minemouth price⁸								
(nominal dollars per short ton)	32.4	32.9	41.2	47.3	55.2	65.3	85.5	2.9%
(nominal dollars per million Btu).....	1.62	1.63	2.05	2.36	2.74	3.22	4.23	2.9%
Delivered prices⁹								
(nominal dollars per short ton)								
Commercial and institutional.....	85.8	84.9	99.9	114.6	128.5	146.0	190.7	2.5%
Coke plants.....	118.3	118.3	156.9	178.2	203.2	231.7	313.6	3.0%
Other industrial ⁵	67.4	67.7	85.8	95.1	105.4	119.4	157.6	2.6%
Coal to liquids	--	--	--	--	--	--	--	--
Electric power ⁶								
(nominal dollars per short ton)	41.4	41.3	52.8	59.6	68.0	78.4	102.0	2.8%
(nominal dollars per million Btu).....	2.16	2.15	2.76	3.11	3.54	4.06	5.29	2.8%
Average	44.5	44.6	57.2	64.4	73.7	84.9	110.8	2.8%
Exports ¹⁰	82.5	79.0	97.2	104.6	119.3	140.4	186.3	2.6%

¹Includes anthracite, bituminous coal, subbituminous coal, and lignite.
²Includes waste coal consumed by the electric power and industrial sectors. Waste coal supplied is counted as a supply-side item to balance the same amount of waste coal included in the consumption data.
³Excludes imports to Puerto Rico and the U.S. Virgin Islands.
⁴Production plus waste coal supplied plus net imports.
⁵Includes consumption for combined heat and power plants that have a non-regulatory status, and small on-site generating systems. Excludes all coal use in the coal-to-liquids process.
⁶Includes all electricity-only and combined heat and power plants that have a regulatory status.
⁷Balancing item: the sum of production, net imports, and waste coal supplied minus total consumption.
⁸Includes reported prices for both open market and captive mines. Prices weighted by production, which differs from average minemouth prices published in EIA data reports where it is weighted by reported sales.
⁹Prices weighted by consumption; weighted average excludes commercial and institutional prices, and export free-alongside-ship prices.
¹⁰Free-alongside-ship price at U.S. port of exit.
-- = Not applicable.
Btu = British thermal unit.
Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.
Sources: 2016 data based on: U.S. Energy Information Administration (EIA), *Annual Coal Report 2013*; EIA, *Quarterly Coal Report, October-December 2016*; and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. 2017: EIA, *Short-Term Energy Outlook, October 2017* and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. **Projections:** EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A16. Renewable energy generating capacity and generation
(gigawatts, unless otherwise noted)

Net summer capacity and generation	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Electric power sector¹								
Net summer capacity								
Conventional hydroelectric power.....	79.0	79.2	79.4	79.4	79.5	79.5	79.7	0.0%
Geothermal ²	2.5	2.5	3.9	5.4	6.7	7.2	8.5	3.8%
Municipal waste ³	3.7	3.7	3.7	3.7	3.7	3.7	3.7	0.0%
Wood and other biomass ⁴	3.6	3.6	3.8	3.8	3.8	3.8	3.8	0.2%
Solar thermal.....	1.8	1.8	1.8	1.8	1.8	1.8	1.8	0.0%
Solar photovoltaic ⁵	19.9	25.3	51.6	63.1	105.5	128.7	172.4	6.0%
Wind.....	81.1	88.9	131.4	131.5	131.7	131.8	138.6	1.4%
Offshore wind.....	0.0	0.0	0.1	0.1	0.1	0.1	0.1	2.2%
Total electric power sector capacity.....	191.7	205.0	275.6	288.8	332.8	356.6	408.5	2.1%
Generation (billion kilowatthours)								
Conventional hydroelectric power.....	266.3	294.7	295.6	295.6	295.8	296.0	296.8	0.0%
Geothermal ²	15.8	17.1	27.9	40.6	50.6	55.2	65.7	4.2%
Biogenic municipal waste ⁶	18.6	19.9	21.1	21.6	21.5	22.0	23.1	0.5%
Wood and other biomass.....	13.5	5.6	9.5	9.2	9.1	9.8	9.8	1.7%
Dedicated plants.....	12.9	4.9	9.2	9.0	8.8	9.5	9.2	1.9%
Cofiring.....	0.6	0.7	0.3	0.3	0.3	0.3	0.6	-0.5%
Solar thermal.....	3.4	3.3	2.9	2.8	2.8	2.8	2.8	-0.5%
Solar photovoltaic ⁵	32.2	43.6	109.4	138.9	244.9	307.8	409.0	7.0%
Wind.....	226.9	245.9	404.3	407.3	409.6	410.5	438.5	1.8%
Offshore wind.....	0.0	0.1	0.1	0.1	0.1	0.1	0.1	2.2%
Total electric power sector generation.....	576.8	630.2	870.8	916.2	1,034.4	1,104.2	1,245.7	2.1%
End-use sectors⁷								
Net summer capacity								
Conventional hydroelectric power.....	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0%
Geothermal.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--
Municipal waste ⁸	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0%
Biomass.....	4.0	4.2	4.5	4.5	4.4	4.6	5.0	0.5%
Solar photovoltaic ⁵	15.7	20.3	52.2	75.1	106.3	144.8	251.3	7.9%
Wind.....	3.1	3.1	3.1	3.2	3.4	3.8	5.1	1.5%
Total end-use sector capacity.....	23.6	28.4	60.6	83.5	114.9	154.1	262.2	7.0%
Generation (billion kilowatthours)								
Conventional hydroelectric power.....	1.5	1.5	1.5	1.5	1.5	1.5	1.5	0.0%
Geothermal.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--
Municipal waste ⁸	3.8	3.8	3.8	3.8	3.8	3.8	3.8	0.0%
Biomass.....	22.0	23.2	23.2	23.0	22.8	24.0	26.0	0.3%
Solar photovoltaic ⁵	21.7	28.2	73.1	106.1	151.8	208.6	367.1	8.1%
Wind.....	3.9	3.9	4.0	4.1	4.3	4.9	6.6	1.6%
Total end-use sector generation.....	52.9	60.6	105.6	138.5	184.3	242.8	405.0	5.9%

Table A16. Renewable energy generating capacity and generation (continued)
(gigawatts, unless otherwise noted)

Net summer capacity and generation	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Total, all sectors								
Net summer capacity								
Conventional hydroelectric power.....	79.3	79.6	79.7	79.7	79.8	79.9	80.0	0.0%
Geothermal.....	2.5	2.5	3.9	5.4	6.7	7.2	8.5	3.8%
Municipal waste.....	4.2	4.2	4.2	4.2	4.2	4.2	4.2	0.0%
Wood and other biomass ⁴	7.6	7.8	8.3	8.2	8.2	8.4	8.8	0.4%
Solar ⁵	37.4	47.4	105.6	139.9	213.5	275.2	425.4	6.9%
Wind.....	84.2	92.0	134.5	134.7	135.2	135.7	143.8	1.4%
Total capacity, all sectors.....	215.3	233.4	336.2	372.3	447.7	510.7	670.7	3.3%
Generation (billion kilowatthours)								
Conventional hydroelectric power.....	267.8	296.2	297.0	297.1	297.3	297.5	298.3	0.0%
Geothermal.....	15.8	17.1	27.9	40.6	50.6	55.2	65.7	4.2%
Municipal waste.....	22.5	23.7	25.0	25.4	25.3	25.9	26.9	0.4%
Wood and other biomass.....	35.5	28.8	32.7	32.2	32.0	33.8	35.8	0.7%
Solar ⁵	57.3	75.1	185.3	247.8	399.5	519.2	778.8	7.3%
Wind.....	230.8	249.9	408.4	411.5	414.1	415.5	445.2	1.8%
Total generation, all sectors.....	629.7	690.8	976.4	1,054.7	1,218.7	1,347.0	1,650.7	2.7%

¹Includes electricity-only and combined heat and power plants that have a regulatory status.

²Includes both hydrothermal resources (hot water and steam) and near-field enhanced geothermal systems (EGS). Near-field EGS potential occurs on known hydrothermal sites, however this potential requires the addition of external fluids for electricity generation and is only available after 2025.

³Includes municipal waste, landfill gas, and municipal sewage sludge. Incremental growth is assumed to be for landfill gas facilities. All municipal waste is included, although a portion of the municipal waste stream contains petroleum-derived plastics and other non-renewable sources.

⁴Facilities co-firing biomass and coal are classified as coal.

⁵Does not include off-grid photovoltaics.

⁶Includes biogenic municipal waste, landfill gas, and municipal sewage sludge. Incremental growth is assumed to be for landfill gas facilities. Only biogenic municipal waste is included. The U.S. Energy Information Administration estimates that in 2017 approximately 7 billion kilowatthours of electricity were generated from a municipal waste stream containing petroleum-derived plastics and other non-renewable sources. See U.S. Energy Information Administration, *Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy* (Washington, DC, May 2007).

⁷Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors that have a non-regulatory status; and small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid.

⁸Includes municipal waste, landfill gas, and municipal sewage sludge. All municipal waste is included, although a portion of the municipal waste stream contains petroleum-derived plastics and other non-renewable sources.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 capacity: U.S. Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report" (preliminary). 2016 generation: EIA, *Monthly Energy Review*, September 2017. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A17. Renewable energy consumption by sector and source
(quadrillion Btu per year)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Marketed renewable energy¹								
Residential (wood)	0.34	0.33	0.37	0.34	0.32	0.30	0.27	-0.6%
Commercial (biomass)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Industrial²	2.30	2.28	2.62	2.83	3.03	3.20	3.51	1.3%
Conventional hydroelectric power.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
Municipal waste ³	0.19	0.19	0.32	0.38	0.39	0.42	0.46	2.7%
Biomass.....	1.28	1.27	1.44	1.60	1.78	1.92	2.23	1.7%
Biofuels heat and coproducts.....	0.83	0.82	0.86	0.86	0.86	0.86	0.83	0.0%
Transportation	1.51	1.55	1.57	1.53	1.51	1.51	1.53	0.0%
Ethanol used in E85 ⁴	0.01	0.01	0.14	0.18	0.20	0.20	0.11	8.8%
Ethanol used in gasoline blending.....	1.16	1.18	1.02	0.90	0.83	0.83	1.00	-0.5%
Biodiesel used in distillate blending.....	0.31	0.30	0.29	0.30	0.30	0.30	0.31	0.0%
Biobutanol.....	0.00	0.00	0.00	0.03	0.06	0.06	0.00	--
Liquids from biomass.....	0.00	0.00	0.00	0.01	0.01	0.01	0.00	--
Renewable diesel and gasoline ⁵	0.04	0.05	0.11	0.11	0.11	0.11	0.12	2.3%
Electric power⁶	5.61	6.08	8.37	8.81	9.91	10.58	11.93	2.1%
Conventional hydroelectric power.....	2.47	2.73	2.74	2.74	2.74	2.74	2.75	0.0%
Geothermal.....	0.15	0.17	0.27	0.38	0.48	0.52	0.62	4.0%
Biogenic municipal waste ⁷	0.34	0.35	0.37	0.38	0.37	0.38	0.40	0.4%
Biomass.....	0.22	0.10	0.16	0.16	0.16	0.17	0.16	1.5%
Dedicated plants.....	0.17	0.07	0.12	0.12	0.12	0.13	0.12	1.9%
Cofiring.....	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.5%
Solar thermal.....	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-0.5%
Solar photovoltaic.....	0.30	0.42	1.06	1.34	2.34	2.94	3.90	7.0%
Wind.....	2.10	2.28	3.75	3.78	3.80	3.81	4.07	1.8%
Total marketed renewable energy	9.90	10.37	13.06	13.65	14.90	15.73	17.37	1.6%
Sources of ethanol								
from corn and other starch.....	1.26	1.29	1.26	1.22	1.17	1.16	1.22	-0.2%
from cellulose.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.8%
Net imports.....	-0.10	-0.10	-0.10	-0.13	-0.15	-0.14	-0.12	0.4%
Total	1.17	1.19	1.17	1.09	1.03	1.03	1.10	-0.2%

Table A17. Renewable energy consumption by sector and source (continued)
(quadrillion Btu per year)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Nonmarketed renewable energy⁸								
Selected consumption								
Residential	0.15	0.18	0.46	0.70	1.02	1.42	2.62	8.4%
Solar hot water heating	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.9%
Geothermal heat pumps	0.01	0.01	0.02	0.02	0.02	0.03	0.04	3.7%
Solar photovoltaic	0.10	0.13	0.40	0.64	0.95	1.35	2.54	9.3%
Wind	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.8%
Commercial	0.16	0.18	0.30	0.36	0.44	0.54	0.77	4.4%
Solar thermal	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.3%
Solar photovoltaic	0.09	0.11	0.22	0.28	0.36	0.46	0.67	5.7%
Wind	0.01	0.01	0.01	0.01	0.01	0.01	0.02	3.4%

¹Includes nonelectric renewable energy groups for which the energy source is bought and sold in the marketplace, although all transactions may not necessarily be marketed, and marketed renewable energy inputs for electricity entering the marketplace on the electric power grid. Excludes electricity imports; see Table A2. Actual heat rates used to determine fuel consumption for all renewable fuels except hydroelectric, geothermal, solar, and wind. Consumption at hydroelectric, geothermal, solar, and wind facilities is determined by using the average electric power sector fossil-fuels net heat rate.

²Includes combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

³Includes municipal waste, landfill gas, and municipal sewage sludge. All municipal waste is included, although a portion of the municipal waste stream contains petroleum-derived plastics and other non-renewable sources.

⁴Excludes motor gasoline component of E85. E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). To address cold starting issues, the percentage of ethanol varies seasonally. The annual average ethanol content of 74 percent is used for these projections.

⁵Renewable feedstocks for the on-site production of diesel and gasoline.

⁶Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.

⁷Includes biogenic municipal waste, landfill gas, and municipal sewage sludge. Incremental growth is assumed to be for landfill gas facilities. Only biogenic municipal waste is included. The U.S. Energy Information Administration estimates that in 2017 approximately 0.3 quadrillion Btus were consumed from a municipal waste stream containing petroleum-derived plastics and other non-renewable sources. See U.S. Energy Information Administration, *Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy* (Washington, DC, May 2007).

⁸Includes selected renewable energy consumption data for which the energy is not bought or sold, either directly or indirectly as an input to marketed energy. The U.S. Energy Information Administration does not estimate or project total consumption of nonmarketed renewable energy.

- = Not applicable.

Btu = British thermal unit.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 ethanol: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. 2016 electric power sector: EIA, Form EIA-860, "Annual Electric Generator Report" (preliminary). Other 2016 values: EIA, Office of Energy Analysis. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A18. Energy-related carbon dioxide emissions by sector and source
(million metric tons, unless otherwise noted)

Sector and source	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Residential								
Petroleum	67	66	55	51	47	44	39	-1.6%
Natural gas	241	241	252	251	250	249	250	0.1%
Electricity ¹	690	657	604	608	596	597	600	-0.3%
Total residential	998	964	911	910	893	889	889	-0.2%
Commercial								
Petroleum	61	65	62	62	61	61	62	-0.1%
Natural gas	171	173	177	182	189	197	217	0.7%
Coal	2	2	4	4	4	4	4	2.2%
Electricity ¹	667	646	608	611	599	602	627	-0.1%
Total commercial	901	886	851	858	853	863	910	0.1%
Industrial²								
Petroleum	339	371	392	400	408	417	425	0.4%
Natural gas ³	487	495	590	612	631	656	690	1.0%
Coal	111	113	114	115	116	117	116	0.1%
Electricity ¹	459	452	478	492	484	488	485	0.2%
Total industrial	1,395	1,430	1,574	1,618	1,640	1,678	1,716	0.6%
Transportation								
Petroleum ⁴	1,835	1,827	1,678	1,586	1,542	1,539	1,623	-0.4%
Natural gas ⁵	39	38	48	52	57	62	76	2.1%
Electricity ¹	5	5	17	28	39	48	65	7.8%
Total transportation	1,879	1,871	1,744	1,667	1,638	1,650	1,764	-0.2%
Electric power⁶								
Petroleum	21	15	10	9	8	8	7	-2.4%
Natural gas	546	495	539	558	565	586	628	0.7%
Coal	1,241	1,239	1,146	1,160	1,132	1,129	1,130	-0.3%
Other ⁷	11	12	12	12	12	12	13	0.3%
Total electric power	1,821	1,760	1,707	1,739	1,718	1,735	1,777	0.0%
Total by fuel								
Petroleum ⁴	2,323	2,344	2,198	2,107	2,067	2,069	2,156	-0.3%
Natural gas	1,485	1,442	1,605	1,656	1,693	1,750	1,860	0.8%
Coal	1,354	1,353	1,264	1,279	1,252	1,249	1,250	-0.2%
Other ⁷	11	12	12	12	12	12	13	0.3%
Total	5,174	5,151	5,079	5,053	5,024	5,080	5,279	0.1%
Carbon dioxide emissions								
(metric tons per person)	16.0	15.8	14.7	14.1	13.6	13.4	13.3	-0.5%

¹Emissions from the electric power sector are distributed to the end-use sectors.

²Includes combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

³Includes lease and plant fuel.

⁴This includes carbon dioxide from international bunker fuels, both civilian and military, which are excluded from the accounting of carbon dioxide emissions under the United Nations convention. From 1990 through 2014, international bunker fuels accounted for 90 to 126 million metric tons annually.

⁵Includes pipeline and distribution fuel natural gas and natural gas used as fuel in motor vehicles, trains, and ships.

⁶Includes electricity-only and combined heat and power plants that have a regulatory status.

⁷Includes emissions from geothermal power and nonbiogenic emissions from municipal waste.

Note: By convention, the direct emissions from biogenic energy sources are excluded from energy-related carbon dioxide emissions. The release of carbon from these sources is assumed to be balanced by the uptake of carbon when the feedstock is grown, resulting in zero net emissions over some period of time. If, however, increased use of biomass energy results in a decline in terrestrial carbon stocks, a net positive release of carbon may occur. See Table A19, "Energy-Related Carbon Dioxide Emissions by End Use", for the emissions from biogenic energy sources as an indication of the potential net release of carbon dioxide in the absence of offsetting sequestration. Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 emissions and emission factors: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A19. Energy-related carbon dioxide emissions by end use
(million metric tons)

Sector and end use	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Residential								
Space heating.....	235	241	240	232	224	217	205	-0.5%
Space cooling.....	127	102	103	107	108	111	116	0.4%
Water heating.....	137	136	132	132	129	127	132	-0.1%
Refrigeration.....	50	48	40	40	40	41	43	-0.3%
Cooking.....	28	28	28	29	29	30	32	0.3%
Clothes dryers.....	30	29	26	26	26	27	29	-0.1%
Freezers.....	11	10	8	8	7	7	7	-1.0%
Lighting.....	65	62	47	45	39	36	30	-2.2%
Clothes washers ¹	4	4	2	2	2	2	2	-1.7%
Dishwashers ¹	14	13	13	14	14	15	16	0.6%
Televisions and related equipment ²	41	39	32	32	34	37	39	0.0%
Computers and related equipment ³	15	15	10	9	7	6	4	-4.0%
Furnace fans and boiler circulation pumps.....	15	15	14	13	12	11	11	-1.0%
Other uses ⁴	217	222	215	220	219	222	224	0.0%
Discrepancy ⁵	10	0	0	0	0	0	0	-1.2%
Total residential.....	998	964	911	910	893	889	889	-0.2%
Commercial								
Space heating ⁶	118	117	114	111	108	106	102	-0.4%
Space cooling ⁶	82	70	65	64	62	61	62	-0.3%
Water heating ⁶	35	35	34	35	36	36	37	0.2%
Ventilation.....	74	72	63	57	51	47	43	-1.6%
Cooking.....	29	29	29	29	30	31	33	0.4%
Lighting.....	72	69	55	52	46	42	34	-2.1%
Refrigeration.....	92	91	83	84	82	82	84	-0.2%
Computing.....	51	48	40	40	40	41	38	-0.7%
Office equipment.....	48	50	67	75	79	84	99	2.1%
Other uses ⁷	301	304	301	312	320	334	379	0.7%
Total commercial.....	901	886	851	858	853	863	910	0.1%
Industrial⁸								
Manufacturing								
Refining.....	260	252	245	238	246	250	252	0.0%
Food products.....	86	83	91	97	102	108	121	1.2%
Paper products.....	58	58	57	54	51	52	52	-0.3%
Bulk chemicals.....	281	295	379	400	405	412	408	1.0%
Glass.....	10	10	10	11	11	11	10	0.2%
Cement and lime.....	32	32	36	32	28	29	31	-0.2%
Iron and steel.....	103	109	102	107	111	112	108	0.0%
Aluminum.....	18	18	20	21	22	22	22	0.6%
Fabricated metal products.....	29	29	30	32	33	35	40	1.0%
Machinery.....	14	14	17	18	18	18	18	0.8%
Computers and electronics.....	15	15	15	16	16	16	17	0.4%
Transportation equipment.....	32	32	30	33	35	36	38	0.5%
Electrical equipment.....	8	8	9	10	10	11	12	1.2%
Wood products.....	13	12	13	14	14	15	16	0.7%
Plastics.....	28	27	29	31	32	33	36	0.8%
Balance of manufacturing.....	113	111	110	110	110	110	112	0.0%
Total manufacturing.....	1,101	1,106	1,193	1,225	1,244	1,273	1,294	0.5%
Nonmanufacturing								
Agriculture.....	81	81	80	83	84	85	88	0.3%
Construction.....	71	68	74	77	79	82	89	0.8%
Mining.....	100	97	107	107	105	105	107	0.3%
Total nonmanufacturing.....	252	246	261	267	268	273	285	0.4%
Discrepancy ⁵	43	78	121	126	128	132	138	1.7%
Total industrial.....	1,395	1,430	1,574	1,618	1,640	1,678	1,716	0.6%

Table A19. Energy-related carbon dioxide emissions by end use (continued)
(million metric tons)

Sector and end use	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Transportation								
Light-duty vehicles.....	1,031	1,013	847	761	715	697	719	-1.0%
Commercial light trucks ⁹	59	61	53	52	52	53	59	-0.1%
Bus transportation.....	16	16	16	16	16	16	16	0.1%
Freight trucks.....	377	384	377	365	359	367	401	0.1%
Rail, passenger.....	5	5	5	5	6	6	6	0.6%
Rail, freight.....	34	35	34	33	32	31	30	-0.4%
Shipping, domestic.....	6	6	5	4	4	3	3	-2.4%
Shipping, international.....	78	78	77	76	74	72	71	-0.3%
Recreational boats.....	16	16	16	16	16	16	16	-0.1%
Air.....	168	169	196	214	232	249	285	1.6%
Military use.....	39	39	39	40	43	46	53	0.9%
Lubricants.....	5	5	5	5	5	5	5	0.2%
Pipeline and distribution fuel.....	37	34	37	37	38	38	40	0.5%
Discrepancy ⁵	8	10	35	41	47	51	59	5.4%
Total transportation.....	1,879	1,871	1,744	1,667	1,638	1,650	1,764	-0.2%
Biogenic energy combustion¹⁰								
Biomass.....	186	172	197	209	224	237	262	1.3%
Electric power sector.....	20	9	15	15	15	16	15	1.5%
Other sectors.....	165	163	182	194	209	221	246	1.3%
Biogenic waste.....	31	31	33	34	34	35	36	0.4%
Biofuels heat and coproducts.....	78	77	80	81	81	80	77	0.0%
Ethanol.....	80	81	80	74	70	70	76	-0.2%
Biodiesel.....	22	22	21	22	22	22	22	0.0%
Liquids from biomass.....	0	0	0	0	0	0	0	--
Renewable diesel and gasoline.....	3	4	8	8	8	8	8	2.3%
Total.....	399	388	421	429	439	453	482	0.7%

¹Does not include water heating portion of load.

²Includes televisions, set-top boxes, home theater systems, DVD players, and video game consoles.

³Includes desktop and laptop computers, monitors, and networking equipment.

⁴Includes small electric devices, heating elements, outdoor grills, natural gas-fueled lights, pool heaters, spa heaters, backup electricity generators, and motors not listed above. Electric vehicles are included in the transportation sector.

⁵Represents differences between total emissions by end-use and total emissions by fuel as reported in Table A18. Emissions by fuel may reflect benchmarking and other modeling adjustments to energy use and the associated emissions that are not assigned to specific end uses.

⁶Includes emissions related to fuel consumption for district services.

⁷Includes emissions related to (but not limited to) miscellaneous uses such as transformers, medical imaging and other medical equipment, elevators, escalators, off-road electric vehicles, laboratory fume hoods, laundry equipment, coffee brewers, water services, emergency generators, combined heat and power in commercial buildings, manufacturing performed in commercial buildings, and cooking (distillate), plus residual fuel oil, propane, coal, motor gasoline, kerosene, and marketed renewable fuels (biomass).

⁸Includes combined heat and power plants that have a non-regulatory status, and small on-site generating systems.

⁹Commercial trucks 8,501 to 10,000 pounds gross vehicle weight rating.

¹⁰By convention, the direct emissions from biogenic energy sources are excluded from energy-related carbon dioxide emissions. The release of carbon from these sources is assumed to be balanced by the uptake of carbon when the feedstock is grown, resulting in zero net emissions over some period of time. If, however, increased use of biomass energy results in a decline in terrestrial carbon stocks, a net positive release of carbon may occur. Accordingly, the emissions from biogenic energy sources are reported here as an indication of the potential net release of carbon dioxide in the absence of offsetting sequestration.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 emissions and emission factors: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, September 2017. 2017: EIA, *Short-Term Energy Outlook*, October 2017 and EIA, AEO2018 National Energy Modeling System run ref2018.d121317a. Projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A20. Macroeconomic indicators
(billion 2009 chain-weighted dollars, unless otherwise noted)

Indicators	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Real gross domestic product	16,716	17,075	20,221	22,421	24,802	27,356	33,205	2.0%
Components of real gross domestic product								
Real consumption	11,572	11,877	14,364	16,126	17,940	19,871	24,338	2.2%
Real investment	2,210	2,306	2,981	3,425	3,913	4,487	5,905	2.9%
Real government spending	2,900	2,905	3,016	3,176	3,370	3,573	4,004	1.0%
Real exports	2,120	2,200	2,920	3,532	4,224	5,019	6,819	3.5%
Real imports	2,706	2,810	3,830	4,656	5,550	6,552	8,990	3.6%
Energy intensity (thousand Btu per 2009 dollar of GDP)								
Delivered energy	4.28	4.22	3.71	3.35	3.06	2.84	2.47	-1.6%
Total energy	5.80	5.67	4.95	4.49	4.10	3.80	3.28	-1.6%
Price indices								
GDP chain-type price index (2009=1.00)	1.11	1.13	1.37	1.53	1.71	1.91	2.44	2.3%
Consumer price index (1982-4=1.00)								
All-urban	2.40	2.45	3.02	3.43	3.89	4.43	5.79	2.6%
Energy commodities and services	1.90	1.99	2.90	3.32	3.79	4.35	5.64	3.2%
Wholesale price index (1982=1.00)								
All commodities	1.85	1.93	2.33	2.54	2.74	2.97	3.50	1.8%
Fuel and power	1.46	1.59	2.33	2.67	3.04	3.50	4.61	3.3%
Metals and metal products	1.94	2.07	2.30	2.38	2.43	2.47	2.53	0.6%
Industrial commodities excluding energy	1.93	1.99	2.28	2.46	2.61	2.78	3.14	1.4%
Interest rates (percent, nominal)								
Federal funds rate	0.40	1.03	3.00	3.00	3.00	3.00	3.00	--
10-year treasury note	1.84	2.40	4.03	4.01	4.03	4.07	4.07	--
AA utility bond rate	3.73	3.92	6.07	5.97	5.95	5.97	5.91	--
Value of shipments (billion 2009 dollars)								
Non-industrial and service sectors	21,674	22,698	27,021	30,402	34,118	38,086	46,102	2.2%
Total industrial	7,335	7,575	8,777	9,540	10,320	11,171	12,908	1.6%
Agriculture, mining, and construction	2,046	2,031	2,450	2,603	2,744	2,905	3,265	1.4%
Manufacturing	5,289	5,544	6,327	6,936	7,576	8,266	9,643	1.7%
Energy-intensive	1,903	1,971	2,244	2,377	2,506	2,654	2,939	1.2%
Non-energy-intensive	3,386	3,573	4,082	4,560	5,070	5,612	6,704	1.9%
Total shipments	29,008	30,272	35,798	39,942	44,439	49,257	59,010	2.0%
Population and employment (millions)								
Population, with armed forces overseas	324	326	347	359	370	379	398	0.6%
Population, aged 16 and over	258	261	280	291	301	310	327	0.7%
Population, aged 65 and over	49	51	66	74	79	82	88	1.7%
Employment, nonfarm	144	146	156	161	166	172	182	0.7%
Employment, manufacturing	12.0	12.5	14.1	14.6	14.7	14.8	14.8	0.5%
Key labor indicators								
Labor force (millions)	159	160	170	176	181	187	198	0.6%
Nonfarm labor productivity (2009=1.00)	1.07	1.08	1.22	1.32	1.43	1.55	1.81	1.6%
Unemployment rate (percent)	4.85	4.40	4.58	4.70	4.66	4.73	4.68	--
Key indicators for energy demand								
Real disposable personal income	12,609	12,826	15,706	17,698	19,747	21,822	26,328	2.2%
Housing starts (millions)	1.26	1.31	1.61	1.62	1.67	1.65	1.75	0.9%
Commercial floorspace (billion square feet)	90	91	99	104	110	115	126	1.0%
Unit sales of light-duty vehicles (millions)	17.5	17.1	16.9	17.4	17.5	18.0	19.5	0.4%

GDP = Gross domestic product.

Btu = British thermal unit.

-- = Not applicable.

Sources: 2016 and 2017: IHS Markit, Macroeconomic and Employment models, August 2017; and IHS Markit, Industry model, May 2017. **Projections:** U.S. Energy Information Administration, AEO2018 National Energy Modeling System run ref2018.d121317a.

Table A21. International petroleum and other liquids supply, disposition, and prices
(million barrels per day, unless otherwise noted)

Supply, disposition, and prices	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Crude oil spot prices								
(2017 dollars per barrel)								
Brent	45	52	86	93	100	106	114	2.4%
West Texas Intermediate	44	50	82	89	95	101	110	2.4%
(nominal dollars per barrel)								
Brent	44	52	104	125	150	179	244	4.8%
West Texas Intermediate	43	50	100	120	143	171	235	4.8%
Petroleum and other liquids consumption¹								
OECD								
United States (50 states)	19.64	19.89	19.67	19.23	19.07	19.24	20.05	0.0%
United States territories	0.26	0.26	0.28	0.29	0.31	0.33	0.38	1.1%
Canada	2.43	2.41	2.28	2.24	2.23	2.24	2.31	-0.1%
Mexico and Chile	2.30	2.26	2.28	2.34	2.44	2.56	2.76	0.6%
OECD Europe ²	14.33	14.41	13.29	13.10	13.01	12.94	12.64	-0.4%
Japan	3.99	3.89	3.50	3.39	3.29	3.18	3.00	-0.8%
South Korea	2.57	2.63	2.56	2.63	2.72	2.81	2.97	0.4%
Australia and New Zealand	1.29	1.29	1.38	1.44	1.50	1.59	1.83	1.1%
Total OECD consumption	46.81	47.04	45.24	44.68	44.56	44.89	45.94	-0.1%
Non-OECD								
Russia	3.68	3.73	3.58	3.50	3.48	3.43	3.22	-0.4%
Other Europe and Eurasia ³	1.98	2.00	1.89	1.84	1.90	1.92	1.97	0.0%
China	12.54	12.90	15.48	16.36	16.86	17.02	16.41	0.7%
India	4.35	4.56	5.39	6.12	7.12	8.32	10.19	2.5%
Other Asia ⁴	8.38	8.58	9.91	10.95	12.14	13.59	16.65	2.0%
Middle East	8.33	8.60	8.98	8.73	9.21	9.82	10.97	0.7%
Africa	4.23	4.37	4.36	4.67	5.13	5.76	7.37	1.6%
Brazil	3.04	2.99	3.30	3.46	3.59	3.78	4.13	1.0%
Other Central and South America	3.51	3.54	3.75	3.86	4.05	4.30	4.90	1.0%
Total non-OECD consumption	50.05	51.27	56.63	59.50	63.48	67.93	75.82	1.2%
Total consumption	96.86	98.32	101.87	104.17	108.03	112.82	121.76	0.7%
Petroleum and other liquids production								
OPEC ⁵								
Middle East	29.86	29.89	31.12	31.85	33.42	35.26	38.36	0.8%
North Africa	2.12	2.49	2.17	2.49	2.89	3.36	4.16	1.6%
West Africa	4.21	4.18	4.41	4.54	4.67	4.78	5.62	0.9%
South America	3.01	2.75	2.23	2.62	3.14	3.76	4.59	1.6%
Total OPEC production	39.19	39.30	39.93	41.50	44.12	47.16	52.74	0.9%
Non-OPEC								
OECD								
United States (50 states)	14.81	15.42	18.90	19.37	19.65	19.75	19.27	0.7%
Canada	4.58	4.75	5.44	5.54	5.85	6.21	7.16	1.3%
Mexico and Chile	2.50	2.32	2.11	2.14	2.28	2.59	3.42	1.2%
OECD Europe ²	4.06	4.11	3.84	3.62	3.50	3.28	2.88	-1.1%
Japan and South Korea	0.22	0.23	0.27	0.28	0.29	0.29	0.30	0.9%
Australia and New Zealand	0.43	0.41	0.47	0.45	0.45	0.55	0.76	1.9%
Total OECD production	26.60	27.24	31.03	31.41	32.02	32.66	33.78	0.7%
Non-OECD								
Russia	11.24	11.19	10.49	10.41	10.52	10.92	11.29	0.0%
Other Europe and Eurasia ³	3.14	3.30	3.41	3.56	3.63	3.57	3.35	0.0%
China	4.45	4.42	5.03	5.24	5.37	5.56	5.94	0.9%
Other Asia ⁴	3.94	3.86	3.47	3.26	3.24	3.26	3.43	-0.4%
Middle East	1.14	1.09	0.84	0.74	0.72	0.71	0.73	-1.2%
Africa	1.76	1.82	1.72	1.66	1.64	1.65	1.74	-0.1%
Brazil	3.18	3.36	4.04	4.51	4.85	5.16	5.91	1.7%
Other Central and South America	2.04	1.99	1.92	1.87	1.92	2.17	2.86	1.1%
Total non-OECD production	30.89	31.02	30.91	31.27	31.90	33.00	35.24	0.4%
Total petroleum and other liquids production	96.69	97.56	101.87	104.17	108.03	112.82	121.76	0.7%
OPEC market share (percent)	40.5	40.3	39.2	39.8	40.8	41.8	43.3	--

Table A21. International petroleum and other liquids supply, disposition, and prices (continued)
(million barrels per day, unless otherwise noted)

Supply, disposition, and prices	Reference case							Annual growth 2017-2050 (percent)
	2016	2017	2025	2030	2035	2040	2050	
Selected world production subtotals:								
Crude oil and equivalents ⁶	80.45	80.78	82.52	84.09	87.37	91.61	99.71	0.6%
Tight oil.....	4.95	5.33	7.33	7.97	8.70	9.86	12.26	2.6%
Bitumen ⁷	2.43	2.53	3.38	3.55	3.73	3.92	4.33	1.7%
Refinery processing gain ⁸	2.58	2.59	2.90	3.01	3.15	3.25	3.47	0.9%
Natural gas plant liquids.....	10.73	11.11	12.96	13.33	13.52	13.68	14.11	0.7%
Liquids from renewable sources ⁹	2.25	2.31	2.62	2.86	3.07	3.32	3.42	1.2%
Liquids from coal ¹⁰	0.23	0.30	0.18	0.20	0.22	0.24	0.29	-0.1%
Liquids from natural gas ¹¹	0.23	0.23	0.41	0.41	0.42	0.42	0.44	1.9%
Liquids from kerogen ¹²	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1.0%
Crude oil production⁶								
OPEC⁵								
Middle East.....	26.53	26.42	27.45	28.18	29.77	31.62	34.75	0.8%
North Africa.....	1.73	2.12	1.79	2.03	2.34	2.68	3.14	1.2%
West Africa.....	4.08	4.02	4.22	4.35	4.47	4.59	5.42	0.9%
South America.....	2.83	2.58	2.07	2.46	2.97	3.59	4.42	1.6%
Total OPEC production.....	35.17	35.13	35.53	37.01	39.55	42.48	47.73	0.9%
Non-OPEC								
OECD								
United States (50 states).....	8.90	9.24	11.38	11.70	11.85	11.90	11.30	0.6%
Canada.....	3.68	3.83	4.37	4.42	4.71	5.06	6.00	1.4%
Mexico and Chile.....	2.19	2.02	1.80	1.83	1.97	2.27	3.11	1.3%
OECD Europe ²	2.98	3.00	2.65	2.38	2.22	1.97	1.51	-2.1%
Japan and South Korea.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.9%
Australia and New Zealand.....	0.32	0.31	0.35	0.34	0.33	0.43	0.64	2.3%
Total OECD production.....	18.08	18.41	20.55	20.66	21.09	21.63	22.56	0.6%
Non-OECD								
Russia.....	10.55	10.57	9.83	9.75	9.86	10.26	10.62	0.0%
Other Europe and Eurasia ³	2.92	3.06	3.15	3.29	3.36	3.31	3.08	0.0%
China.....	3.98	3.85	4.20	4.21	4.19	4.20	4.43	0.4%
Other Asia ⁴	3.15	3.05	2.48	2.21	2.15	2.11	2.19	-1.0%
Middle East.....	1.11	1.06	0.82	0.72	0.70	0.69	0.71	-1.2%
Africa.....	1.33	1.39	1.29	1.23	1.20	1.20	1.29	-0.2%
Brazil.....	2.51	2.67	3.20	3.57	3.80	4.00	4.70	1.7%
Other Central and South America.....	1.64	1.58	1.48	1.43	1.47	1.72	2.39	1.3%
Total non-OECD production.....	27.19	27.24	26.44	26.42	26.74	27.50	29.42	0.2%
Total crude oil production⁶.....	80.45	80.78	82.52	84.09	87.37	91.61	99.71	0.6%
OPEC market share (percent).....	43.7	43.5	43.1	44.0	45.3	46.4	47.9	0.3%

¹Estimated consumption. Includes both OPEC and non-OPEC consumers in the regional breakdown.

²OECD Europe = Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and United Kingdom. (Note: Israel is included in OECD Europe for statistical reporting purposes. Latvia became an OECD member country on July 16, 2016, but it is not reported in OECD Europe for AEO2018.)

³Other Europe and Eurasia = Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Faroe Islands, Georgia, Gibraltar, Kazakhstan, Kosovo, Kyrgyzstan, Latvia, Lithuania, Macedonia, Malta, Moldova, Montenegro, Romania, Serbia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. (Note: Latvia became an OECD member country on July 16, 2016, but it is reported in Other Europe and Eurasia for AEO2018.)

⁴Other Asia = Afghanistan, Bangladesh, Bhutan, Brunei, Burma (Myanmar), Cambodia (Kampuchea), Cook Islands, Fiji, French Polynesia, Hawaiian Trade Zone, Hong Kong, India (for production), Indonesia, Kiribati, Laos, Macau, Malaysia, Maldives, Mongolia, Nauru, Nepal, New Caledonia, Niue, North Korea, Pakistan, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Sri Lanka, Taiwan, Thailand, Timor-Leste (East Timor), Tonga, Vanuatu, Vietnam, and Wake Islands.

⁵OPEC = Algeria, Angola, Ecuador, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

⁶Includes crude oil, lease condensate, tight oil (shale oil), extra-heavy oil, and bitumen (oil sands).

⁷Includes diluted and upgraded/synthetic bitumen (syncrude).

⁸The volumetric amount by which total output is greater than input due to the processing of crude oil into products which, in total, have a lower specific gravity than the crude oil processed.

⁹Includes liquids produced from energy crops.

¹⁰Includes liquids converted from coal via the Fischer-Tropsch coal-to-liquids process.

¹¹Includes liquids converted from natural gas via the Fischer-Tropsch gas-to-liquids process.

¹²Includes liquids produced from kerogen (oil shale, not to be confused with tight oil (shale oil)).

OECD = Organization for Economic Cooperation and Development.

OPEC = Organization of the Petroleum Exporting Countries.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2016 are model results and may differ from official EIA data reports.

Sources: 2016 Brent and West Texas Intermediate crude oil spot prices: Thomson Reuters. 2016 quantities and projections: EIA, AEO2018 National Energy Modeling System run ref2018.d121317a and EIA, Generate World Oil Balance application.