

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

Supply, disposition, and prices	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Production</b>								
Crude oil and lease condensate .....	19.69	18.28	21.69	22.02	21.37	21.56	20.53	0.3%
Natural gas plant liquids .....	4.47	4.78	6.45	6.44	6.36	6.36	6.29	0.8%
Dry natural gas .....	27.92	27.40	34.15	36.06	37.73	38.98	41.61	1.2%
Coal <sup>1</sup> .....	16.99	15.18	15.06	13.24	12.88	12.59	11.99	-0.7%
Nuclear / uranium <sup>2</sup> .....	8.34	8.34	8.09	8.03	7.54	7.34	6.36	-0.8%
Conventional hydroelectric power .....	2.36	2.50	2.95	2.97	2.98	2.99	3.02	0.6%
Biomass <sup>3</sup> .....	4.30	4.20	4.45	4.45	4.41	4.48	4.54	0.2%
Other renewable energy <sup>4</sup> .....	2.64	3.04	6.20	6.66	7.20	8.04	9.73	3.5%
Other <sup>5</sup> .....	0.46	0.92	1.03	0.85	0.87	0.91	0.92	0.0%
<b>Total .....</b>	<b>87.16</b>	<b>84.64</b>	<b>100.06</b>	<b>100.73</b>	<b>101.36</b>	<b>103.24</b>	<b>104.98</b>	<b>0.6%</b>
<b>Imports</b>								
Crude oil .....	16.33	17.49	16.63	16.41	16.83	17.12	18.87	0.2%
Petroleum and other liquids <sup>6</sup> .....	4.25	4.18	4.26	4.03	3.96	3.94	3.75	-0.3%
Natural gas <sup>7</sup> .....	2.79	3.08	1.74	1.48	1.36	1.31	1.29	-2.5%
Other imports <sup>8</sup> .....	0.47	0.45	0.29	0.23	0.19	0.18	0.18	-2.7%
<b>Total .....</b>	<b>23.83</b>	<b>25.20</b>	<b>22.93</b>	<b>22.15</b>	<b>22.34</b>	<b>22.55</b>	<b>24.08</b>	<b>-0.1%</b>
<b>Exports</b>								
Petroleum and other liquids <sup>9</sup> .....	9.17	10.19	14.60	15.41	15.27	15.16	13.17	0.8%
Natural gas <sup>10</sup> .....	1.80	2.09	6.47	6.86	7.14	7.07	6.88	3.6%
Coal .....	1.96	1.46	1.64	1.73	1.89	2.03	2.13	1.1%
<b>Total .....</b>	<b>12.93</b>	<b>13.74</b>	<b>22.70</b>	<b>24.00</b>	<b>24.30</b>	<b>24.26</b>	<b>22.17</b>	<b>1.4%</b>
<b>Discrepancy<sup>11</sup> .....</b>	<b>1.14</b>	<b>-0.37</b>	<b>0.05</b>	<b>0.15</b>	<b>0.19</b>	<b>0.15</b>	<b>0.20</b>	<b>--</b>
<b>Consumption</b>								
Petroleum and other liquids <sup>12</sup> .....	36.57	36.89	37.03	35.81	35.54	36.16	38.54	0.1%
Natural gas .....	28.19	28.59	29.14	30.36	31.61	32.87	35.65	0.7%
Coal <sup>13</sup> .....	15.47	13.93	13.47	11.51	10.97	10.55	9.85	-1.0%
Nuclear / uranium <sup>2</sup> .....	8.34	8.34	8.09	8.03	7.54	7.34	6.36	-0.8%
Conventional hydroelectric power .....	2.36	2.50	2.95	2.97	2.98	2.99	3.02	0.6%
Biomass <sup>14</sup> .....	2.92	2.76	2.91	2.94	2.93	3.00	3.10	0.3%
Other renewable energy <sup>4</sup> .....	2.64	3.04	6.20	6.66	7.20	8.04	9.73	3.5%
Other <sup>15</sup> .....	0.45	0.42	0.45	0.44	0.43	0.43	0.44	0.2%
<b>Total .....</b>	<b>96.93</b>	<b>96.47</b>	<b>100.24</b>	<b>98.73</b>	<b>99.21</b>	<b>101.38</b>	<b>106.70</b>	<b>0.3%</b>
<b>Prices (2016 dollars per unit)</b>								
Crude oil spot prices (dollars per barrel)								
Brent .....	53	43	86	95	102	109	117	3.0%
West Texas Intermediate .....	49	43	80	88	96	103	110	2.8%
Natural gas at Henry Hub (dollars per million Btu)	2.66	2.50	4.51	5.00	5.09	5.07	5.83	2.5%
Coal (dollars per ton)								
at the minemouth <sup>16</sup> .....	34.2	33.9	34.7	34.3	36.5	37.9	40.1	0.5%
Coal (dollars per million Btu)								
at the minemouth <sup>16</sup> .....	1.72	1.69	1.75	1.74	1.82	1.87	1.96	0.4%
Average end-use <sup>17</sup> .....	2.45	2.34	2.54	2.54	2.55	2.58	2.57	0.3%
Average electricity (cents per kilowatt-hour) .....	10.6	10.3	11.2	11.4	11.4	11.4	11.6	0.4%

**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 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Prices (nominal dollars per unit)</b>								
Crude oil spot prices (dollars per barrel)								
Brent .....	52	43	104	128	152	179	236	5.1%
West Texas Intermediate .....	49	43	97	118	143	169	223	5.0%
Natural gas at Henry Hub (dollars per million Btu)	2.62	2.50	5.45	6.76	7.60	8.31	11.80	4.7%
Coal (dollars per ton)								
at the minemouth <sup>16</sup> .....	33.7	33.9	42.0	46.3	54.5	62.1	81.1	2.6%
Coal (dollars per million Btu)								
at the minemouth <sup>16</sup> .....	1.70	1.69	2.11	2.34	2.71	3.07	3.97	2.5%
Average end-use <sup>17</sup> .....	2.42	2.34	3.07	3.43	3.81	4.23	5.20	2.4%
Average electricity (cents per kilowatthour) .....	10.4	10.3	13.5	15.4	17.0	18.6	23.5	2.5%

<sup>1</sup>Includes waste coal.

<sup>2</sup>These 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.

<sup>3</sup>Includes 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.

<sup>4</sup>Includes 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.

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

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

<sup>7</sup>Includes imports of liquefied natural gas that are later re-exported.

<sup>8</sup>Includes coal, coal coke (net), and electricity (net). Excludes imports of fuel used in nuclear power plants.

<sup>9</sup>Includes crude oil, petroleum products, ethanol, and biodiesel.

<sup>10</sup>Includes re-exported liquefied natural gas.

<sup>11</sup>Balancing item. Includes unaccounted for supply, losses, gains, and net storage withdrawals.

<sup>12</sup>Estimated 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.

<sup>13</sup>Excludes coal converted to coal-based synthetic liquids and natural gas.

<sup>14</sup>Includes 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.

<sup>15</sup>Includes non-biogenic municipal waste, liquid hydrogen, and net electricity imports.

<sup>16</sup>Includes 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.

<sup>17</sup>Prices 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 natural gas supply values: U.S. Energy Information Administration (EIA), *Natural Gas Monthly*, December 2015). 2015 coal minemouth and delivered coal prices: EIA, *Annual Coal Report 2013*. 2015 petroleum supply values: EIA, *Petroleum Supply Annual 2015*. 2015 crude oil spot prices and natural gas spot price at Henry Hub: Thomson Reuters. Other 2015 coal values: *Quarterly Coal Report, October-December 2015*. Other 2015 values: EIA, *Monthly Energy Review*, October 2016. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Energy consumption</b>								
<b>Residential</b>								
Propane .....	0.47	0.43	0.43	0.41	0.39	0.38	0.36	-0.5%
Kerosene .....	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-2.0%
Distillate fuel oil.....	0.51	0.43	0.40	0.36	0.33	0.30	0.25	-1.6%
Petroleum and other liquids subtotal.....	1.00	0.87	0.84	0.78	0.73	0.69	0.62	-1.0%
Natural gas .....	4.76	4.56	4.80	4.76	4.72	4.69	4.69	0.1%
Renewable energy <sup>1</sup> .....	0.44	0.37	0.40	0.37	0.35	0.33	0.30	-0.6%
Electricity .....	4.78	4.81	4.72	4.78	4.90	5.05	5.19	0.2%
<b>Delivered energy</b> .....	<b>10.97</b>	<b>10.62</b>	<b>10.75</b>	<b>10.69</b>	<b>10.70</b>	<b>10.75</b>	<b>10.80</b>	<b>0.1%</b>
Electricity related losses .....	9.57	9.39	9.10	8.90	8.88	8.96	8.82	-0.2%
<b>Total</b> .....	<b>20.54</b>	<b>20.01</b>	<b>19.85</b>	<b>19.60</b>	<b>19.58</b>	<b>19.71</b>	<b>19.63</b>	<b>-0.1%</b>
<b>Commercial</b>								
Propane .....	0.16	0.19	0.19	0.20	0.21	0.22	0.23	0.5%
Motor gasoline <sup>2</sup> .....	0.06	0.07	0.06	0.06	0.07	0.07	0.08	0.5%
Kerosene .....	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.4%
Distillate fuel oil.....	0.34	0.41	0.40	0.39	0.38	0.37	0.35	-0.4%
Residual fuel oil .....	0.01	0.06	0.07	0.06	0.06	0.06	0.06	0.5%
Petroleum and other liquids subtotal.....	0.57	0.73	0.72	0.72	0.72	0.72	0.74	0.0%
Natural gas .....	3.30	3.23	3.24	3.27	3.36	3.48	3.79	0.5%
Coal .....	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.7%
Renewable energy <sup>3</sup> .....	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Electricity .....	4.63	4.64	4.62	4.68	4.80	4.99	5.53	0.5%
<b>Delivered energy</b> .....	<b>8.67</b>	<b>8.77</b>	<b>8.76</b>	<b>8.85</b>	<b>9.06</b>	<b>9.37</b>	<b>10.23</b>	<b>0.5%</b>
Electricity related losses .....	9.29	9.06	8.91	8.71	8.70	8.87	9.41	0.1%
<b>Total</b> .....	<b>17.96</b>	<b>17.82</b>	<b>17.67</b>	<b>17.56</b>	<b>17.77</b>	<b>18.24</b>	<b>19.64</b>	<b>0.3%</b>
<b>Industrial<sup>4</sup></b>								
Liquefied petroleum gases and other <sup>5</sup> .....	2.49	2.49	3.27	3.38	3.51	3.65	3.82	1.3%
Motor gasoline <sup>2</sup> .....	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.2%
Distillate fuel oil.....	1.34	1.29	1.54	1.55	1.58	1.63	1.75	0.9%
Residual fuel oil .....	0.04	0.05	0.05	0.05	0.05	0.04	0.05	-0.2%
Petrochemical feedstocks.....	0.66	0.66	0.98	1.02	1.07	1.13	1.19	1.8%
Other petroleum <sup>6</sup> .....	3.39	3.42	3.57	3.65	3.73	3.87	4.19	0.6%
Petroleum and other liquids subtotal.....	8.14	8.14	9.63	9.87	10.16	10.56	11.24	1.0%
Natural gas .....	7.78	7.95	9.17	9.12	9.38	9.77	10.44	0.8%
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 <sup>7</sup> .....	1.63	1.62	1.79	1.86	1.92	1.98	2.09	0.8%
Natural gas liquefaction for export <sup>8</sup> .....	0.00	0.02	0.38	0.42	0.46	0.46	0.46	10.3%
Natural gas subtotal.....	9.41	9.58	11.34	11.40	11.75	12.21	12.98	0.9%
Metallurgical coal.....	0.56	0.52	0.43	0.39	0.33	0.28	0.20	-2.8%
Other industrial coal.....	0.76	0.73	0.75	0.71	0.67	0.66	0.66	-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	0.00	0.00	0.00	0.01	0.01	0.01	-
Coal subtotal.....	1.31	1.25	1.19	1.11	1.01	0.95	0.87	-1.1%
Biofuels heat and coproducts .....	0.85	0.90	0.86	0.85	0.84	0.84	0.80	-0.3%
Renewable energy <sup>9</sup> .....	1.49	1.45	1.60	1.62	1.64	1.70	1.84	0.7%
Electricity .....	3.27	3.23	3.80	3.78	3.84	3.96	4.22	0.8%
<b>Delivered energy</b> .....	<b>24.45</b>	<b>24.55</b>	<b>28.42</b>	<b>28.62</b>	<b>29.24</b>	<b>30.23</b>	<b>31.95</b>	<b>0.8%</b>
Electricity related losses .....	6.55	6.30	7.32	7.03	6.96	7.04	7.17	0.4%
<b>Total</b> .....	<b>31.01</b>	<b>30.85</b>	<b>35.74</b>	<b>35.65</b>	<b>36.21</b>	<b>37.27</b>	<b>39.12</b>	<b>0.7%</b>

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Transportation</b>								
Propane .....	0.01	0.01	0.01	0.01	0.01	0.02	0.02	2.0%
Motor gasoline <sup>2</sup> .....	17.02	17.27	15.38	13.98	13.23	13.04	13.56	-0.7%
of which: E85 <sup>10</sup> .....	0.02	0.03	0.07	0.14	0.18	0.16	0.17	5.1%
Jet fuel <sup>11</sup> .....	2.83	2.83	3.29	3.54	3.79	4.08	4.66	1.5%
Distillate fuel oil <sup>12</sup> .....	6.63	6.54	6.78	6.43	6.29	6.40	6.96	0.2%
Residual fuel oil .....	0.45	0.60	0.52	0.57	0.63	0.66	0.74	0.6%
Other petroleum <sup>13</sup> .....	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.1%
Petroleum and other liquids subtotal .....	27.10	27.40	26.14	24.68	24.11	24.36	26.10	-0.1%
Pipeline fuel natural gas .....	0.69	0.69	0.71	0.73	0.76	0.78	0.83	0.6%
Compressed / liquefied natural gas .....	0.06	0.07	0.13	0.18	0.23	0.29	0.42	5.3%
Liquid hydrogen .....	0.00	0.00	0.03	0.04	0.05	0.06	0.08	15.6%
Electricity .....	0.03	0.04	0.14	0.22	0.28	0.33	0.41	7.4%
<b>Delivered energy</b> .....	<b>27.89</b>	<b>28.20</b>	<b>27.15</b>	<b>25.85</b>	<b>25.43</b>	<b>25.82</b>	<b>27.85</b>	<b>0.0%</b>
Electricity related losses .....	0.06	0.07	0.28	0.41	0.51	0.59	0.70	7.0%
<b>Total</b> .....	<b>27.95</b>	<b>28.27</b>	<b>27.43</b>	<b>26.27</b>	<b>25.95</b>	<b>26.41</b>	<b>28.54</b>	<b>0.0%</b>
<b>Unspecified sector<sup>14</sup></b> .....	<b>-0.52</b>	<b>-0.48</b>	<b>-0.44</b>	<b>-0.35</b>	<b>-0.29</b>	<b>-0.25</b>	<b>-0.23</b>	<b>-2.1%</b>
<b>Delivered energy consumption for all sectors</b>								
Liquefied petroleum gases and other <sup>5</sup> .....	3.13	3.13	3.90	4.00	4.13	4.27	4.44	1.0%
Motor gasoline <sup>2</sup> .....	16.93	17.28	15.33	13.96	13.24	13.06	13.58	-0.7%
of which: E85 <sup>10</sup> .....	0.02	0.03	0.07	0.14	0.18	0.16	0.17	5.1%
Jet fuel <sup>11</sup> .....	3.18	3.28	3.70	3.98	4.27	4.60	5.25	1.4%
Kerosene .....	0.01	0.02	0.01	0.01	0.01	0.01	0.01	-0.7%
Distillate fuel oil .....	8.32	8.02	8.61	8.24	8.10	8.20	8.78	0.3%
Residual fuel oil .....	0.50	0.71	0.63	0.68	0.73	0.77	0.86	0.6%
Petrochemical feedstocks .....	0.66	0.66	0.98	1.02	1.07	1.13	1.19	1.8%
Other petroleum <sup>15</sup> .....	3.54	3.58	3.73	3.81	3.89	4.04	4.36	0.6%
Petroleum and other liquids subtotal .....	36.28	36.67	36.89	35.71	35.44	36.07	38.47	0.1%
Natural gas .....	15.90	15.81	17.33	17.32	17.69	18.23	19.33	0.6%
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 <sup>7</sup> .....	1.63	1.62	1.79	1.86	1.92	1.98	2.09	0.8%
Natural gas liquefaction for export <sup>8</sup> .....	0.00	0.02	0.38	0.42	0.46	0.46	0.46	10.3%
Pipeline fuel natural gas .....	0.69	0.69	0.71	0.73	0.76	0.78	0.83	0.6%
Natural gas subtotal .....	18.22	18.13	20.22	20.34	20.82	21.45	22.71	0.7%
Metallurgical coal .....	0.56	0.52	0.43	0.39	0.33	0.28	0.20	-2.8%
Other coal .....	0.80	0.77	0.80	0.75	0.72	0.71	0.71	-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	0.00	0.00	0.00	0.01	0.01	0.01	--
Coal subtotal .....	1.34	1.29	1.23	1.15	1.06	0.99	0.92	-1.0%
Biofuels heat and coproducts .....	0.85	0.90	0.86	0.85	0.84	0.84	0.80	-0.3%
Renewable energy <sup>16</sup> .....	2.06	1.95	2.13	2.12	2.12	2.17	2.27	0.4%
Liquid hydrogen .....	0.00	0.00	0.03	0.04	0.05	0.06	0.08	15.6%
Electricity .....	12.71	12.72	13.28	13.47	13.82	14.34	15.35	0.6%
<b>Delivered energy</b> .....	<b>71.46</b>	<b>71.66</b>	<b>74.63</b>	<b>73.67</b>	<b>74.15</b>	<b>75.92</b>	<b>80.60</b>	<b>0.3%</b>
Electricity related losses .....	25.47	24.81	25.61	25.06	25.06	25.46	26.10	0.1%
<b>Total</b> .....	<b>96.93</b>	<b>96.47</b>	<b>100.24</b>	<b>98.73</b>	<b>99.21</b>	<b>101.38</b>	<b>106.70</b>	<b>0.3%</b>
<b>Electric power<sup>17</sup></b>								
Distillate fuel oil .....	0.07	0.09	0.09	0.07	0.06	0.06	0.05	-1.7%
Residual fuel oil .....	0.22	0.13	0.05	0.04	0.04	0.03	0.02	-5.4%
Petroleum and other liquids subtotal .....	0.29	0.22	0.13	0.11	0.10	0.09	0.07	-3.2%
Natural gas .....	9.97	10.46	8.93	10.03	10.78	11.43	12.94	0.6%
Steam coal .....	14.13	12.64	12.24	10.36	9.92	9.55	8.93	-1.0%
Nuclear / uranium <sup>18</sup> .....	8.34	8.34	8.09	8.03	7.54	7.34	6.36	-0.8%
Renewable energy <sup>19</sup> .....	5.01	5.44	9.08	9.61	10.16	11.02	12.78	2.5%
Non-biogenic municipal waste .....	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.0%
Electricity imports .....	0.23	0.19	0.19	0.17	0.15	0.14	0.14	-0.9%
<b>Total</b> .....	<b>38.19</b>	<b>37.53</b>	<b>38.89</b>	<b>38.53</b>	<b>38.88</b>	<b>39.80</b>	<b>41.45</b>	<b>0.3%</b>

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Total energy consumption</b>								
Liquefied petroleum gases and other <sup>5</sup> .....	3.13	3.13	3.90	4.00	4.13	4.27	4.44	1.0%
Motor gasoline <sup>2</sup> .....	16.93	17.28	15.33	13.96	13.24	13.06	13.58	-0.7%
of which: E85 <sup>10</sup> .....	0.02	0.03	0.07	0.14	0.18	0.16	0.17	5.1%
Jet fuel <sup>11</sup> .....	3.18	3.28	3.70	3.98	4.27	4.60	5.25	1.4%
Kerosene .....	0.01	0.02	0.01	0.01	0.01	0.01	0.01	-0.7%
Distillate fuel oil .....	8.39	8.11	8.69	8.31	8.16	8.26	8.83	0.3%
Residual fuel oil .....	0.72	0.83	0.68	0.72	0.77	0.80	0.88	0.1%
Petrochemical feedstocks .....	0.66	0.66	0.98	1.02	1.07	1.13	1.19	1.8%
Other petroleum <sup>15</sup> .....	3.54	3.58	3.73	3.81	3.89	4.04	4.36	0.6%
Petroleum and other liquids subtotal .....	36.57	36.89	37.03	35.81	35.54	36.16	38.54	0.1%
Natural gas .....	25.87	26.27	26.26	27.35	28.48	29.65	32.27	0.6%
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 <sup>7</sup> .....	1.63	1.62	1.79	1.86	1.92	1.98	2.09	0.8%
Natural gas liquefaction for export <sup>8</sup> .....	0.00	0.02	0.38	0.42	0.46	0.46	0.46	10.3%
Pipeline fuel natural gas .....	0.69	0.69	0.71	0.73	0.76	0.78	0.83	0.6%
Natural gas subtotal .....	28.19	28.59	29.14	30.36	31.61	32.87	35.65	0.7%
Metallurgical coal .....	0.56	0.52	0.43	0.39	0.33	0.28	0.20	-2.8%
Other coal .....	14.93	13.41	13.04	11.11	10.63	10.26	9.64	-1.0%
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	0.00	0.00	0.00	0.01	0.01	0.01	--
Coal subtotal .....	15.47	13.93	13.47	11.51	10.97	10.55	9.85	-1.0%
Nuclear / uranium <sup>18</sup> .....	8.34	8.34	8.09	8.03	7.54	7.34	6.36	-0.8%
Biofuels heat and coproducts .....	0.85	0.90	0.86	0.85	0.84	0.84	0.80	-0.3%
Renewable energy <sup>20</sup> .....	7.06	7.39	11.20	11.73	12.28	13.18	15.05	2.1%
Liquid hydrogen .....	0.00	0.00	0.03	0.04	0.05	0.06	0.08	15.6%
Non-biogenic municipal waste .....	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.0%
Electricity imports .....	0.23	0.19	0.19	0.17	0.15	0.14	0.14	-0.9%
<b>Total .....</b>	<b>96.93</b>	<b>96.47</b>	<b>100.24</b>	<b>98.73</b>	<b>99.21</b>	<b>101.38</b>	<b>106.70</b>	<b>0.3%</b>
<b>Energy use and related statistics</b>								
Delivered energy use .....	71.46	71.66	74.63	73.67	74.15	75.92	80.60	0.3%
Total energy use .....	96.93	96.47	100.24	98.73	99.21	101.38	106.70	0.3%
Ethanol consumed in motor gasoline and E85 .....	1.18	1.22	1.17	1.12	1.10	1.10	1.25	0.1%
Population (millions) .....	322	324	348	360	371	381	399	0.6%
Gross domestic product (billion 2009 dollars) .....	16,397	16,652	20,558	22,585	25,054	27,852	33,653	2.1%
Carbon dioxide emissions (million metric tons) .....	5,259	5,157	5,069	4,851	4,827	4,878	5,084	0.0%

<sup>1</sup>Includes 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.

<sup>2</sup>Includes ethanol and ethers blended into gasoline.

<sup>3</sup>Excludes 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.

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

<sup>5</sup>Includes ethane, natural gasoline, and refinery olefins.

<sup>6</sup>Includes petroleum coke, asphalt, road oil, lubricants, still gas, and miscellaneous petroleum products.

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

<sup>8</sup>Fuel used in facilities that liquefy natural gas for export.

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

<sup>10</sup>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.

<sup>11</sup>Includes only kerosene type.

<sup>12</sup>Diesel fuel for on- and off- road use.

<sup>13</sup>Includes aviation gasoline and lubricants.

<sup>14</sup>Represents consumption unattributed to the sectors above.

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

<sup>16</sup>Includes 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.

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

<sup>18</sup>These 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.

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

<sup>20</sup>Includes 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 consumption based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. 2015 and 2016 population and gross domestic product: IHS Markit, *Macroeconomic model*, August 2016. 2015 carbon dioxide emissions and emission factors: EIA, *Monthly Energy Review*, October 2016. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. **Projections:** EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Residential</b>								
Propane .....	17.18	16.26	18.13	18.58	19.60	20.85	22.50	1.0%
Distillate fuel oil .....	19.63	15.40	24.05	25.34	26.69	28.02	29.37	1.9%
Natural gas .....	10.25	9.91	11.42	12.37	12.83	13.18	14.34	1.1%
Electricity .....	37.60	36.47	40.10	40.80	40.64	40.69	42.18	0.4%
<b>Commercial</b>								
Propane .....	15.33	14.54	16.15	16.53	17.42	18.49	19.91	0.9%
Distillate fuel oil .....	17.25	13.52	20.37	21.77	23.08	24.22	25.40	1.9%
Residual fuel oil .....	7.28	5.38	11.01	12.10	13.18	14.16	15.28	3.1%
Natural gas .....	8.03	7.19	10.14	10.93	11.25	11.44	12.27	1.6%
Electricity .....	31.63	30.38	33.61	34.26	33.96	33.75	33.98	0.3%
<b>Industrial<sup>1</sup></b>								
Propane .....	12.43	11.49	13.41	13.87	14.92	16.20	17.89	1.3%
Distillate fuel oil .....	17.25	13.53	20.80	22.25	23.57	24.69	25.86	1.9%
Residual fuel oil .....	7.01	5.15	12.95	14.05	15.12	16.09	17.20	3.6%
Natural gas <sup>2</sup> .....	3.73	3.50	5.48	5.90	5.94	5.93	6.58	1.9%
Metallurgical coal .....	5.43	5.64	6.58	7.10	7.36	7.40	7.13	0.7%
Other industrial coal .....	3.40	3.34	3.46	3.45	3.43	3.45	3.55	0.2%
Coal to liquids .....	--	--	--	--	--	--	--	--
Electricity .....	20.54	20.36	22.10	22.80	22.71	22.74	23.33	0.4%
<b>Transportation</b>								
Propane .....	18.25	17.33	19.19	19.64	20.67	21.91	23.56	0.9%
E85 <sup>3</sup> .....	29.03	25.93	29.80	25.76	25.66	28.74	31.15	0.5%
Motor gasoline <sup>4</sup> .....	21.16	18.34	24.31	25.15	26.22	27.47	28.60	1.3%
Jet fuel <sup>5</sup> .....	12.22	9.75	17.68	19.22	20.66	22.10	23.92	2.7%
Diesel fuel (distillate fuel oil) <sup>6</sup> .....	20.06	16.80	25.73	27.23	28.55	29.62	30.75	1.8%
Residual fuel oil .....	8.06	5.96	11.71	12.88	13.99	15.08	16.35	3.0%
Natural gas <sup>7</sup> .....	16.43	16.45	16.44	15.86	15.33	15.09	15.63	-0.2%
Electricity .....	30.61	29.68	39.36	40.31	39.70	39.24	38.89	0.8%
<b>Electric power<sup>8</sup></b>								
Distillate fuel oil .....	15.26	11.95	19.48	20.75	21.98	23.26	24.62	2.1%
Residual fuel oil .....	10.13	8.09	15.41	16.63	17.69	18.53	18.90	2.5%
Natural gas .....	3.29	3.02	4.81	5.29	5.39	5.44	6.13	2.1%
Steam coal .....	2.28	2.14	2.33	2.30	2.32	2.37	2.39	0.3%
Uranium .....	0.54	0.56	0.74	0.82	0.94	1.08	1.43	2.8%
<b>Average price to all users<sup>9</sup></b>								
Propane .....	14.84	14.05	15.95	16.35	17.31	18.49	20.02	1.0%
E85 <sup>3</sup> .....	29.03	25.93	29.80	25.76	25.66	28.74	31.15	0.5%
Motor gasoline <sup>4</sup> .....	21.14	18.33	24.31	25.15	26.22	27.48	28.60	1.3%
Jet fuel <sup>5</sup> .....	12.22	9.75	17.68	19.22	20.66	22.10	23.92	2.7%
Distillate fuel oil .....	19.43	15.98	24.47	25.91	27.20	28.30	29.49	1.8%
Residual fuel oil .....	8.62	6.19	11.98	13.09	14.17	15.20	16.37	2.9%
Natural gas .....	5.34	4.91	6.98	7.49	7.60	7.65	8.34	1.6%
Metallurgical coal .....	5.43	5.64	6.58	7.10	7.36	7.40	7.13	0.7%
Other coal .....	2.34	2.21	2.40	2.38	2.40	2.45	2.48	0.3%
Coal to liquids .....	--	--	--	--	--	--	--	--
Electricity .....	31.02	30.14	32.69	33.47	33.32	33.28	33.96	0.4%
<b>Non-renewable energy expenditures by sector (billion 2016 dollars)</b>								
Residential .....	247	234	262	271	276	284	302	0.7%
Commercial .....	183	174	202	211	216	224	252	1.1%
Industrial <sup>1</sup> .....	171	158	248	263	279	299	340	2.3%
Transportation .....	522	450	609	602	617	656	739	1.5%
Total non-renewable expenditures .....	1,122	1,016	1,320	1,347	1,389	1,463	1,633	1.4%
Transportation renewable expenditures .....	1	1	2	4	5	5	5	5.7%
<b>Total expenditures .....</b>	<b>1,123</b>	<b>1,017</b>	<b>1,322</b>	<b>1,351</b>	<b>1,393</b>	<b>1,468</b>	<b>1,638</b>	<b>1.4%</b>

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Residential</b>								
Propane .....	16.94	16.26	21.94	25.10	29.26	34.19	45.53	3.1%
Distillate fuel oil.....	19.36	15.40	29.10	34.24	39.83	45.96	59.44	4.1%
Natural gas .....	10.11	9.91	13.81	16.72	19.16	21.62	29.03	3.2%
Electricity .....	37.08	36.47	48.52	55.12	60.66	66.73	85.37	2.5%
<b>Commercial</b>								
Propane .....	15.12	14.54	19.54	22.34	26.00	30.32	40.29	3.0%
Distillate fuel oil.....	17.01	13.52	24.64	29.42	34.46	39.72	51.40	4.0%
Residual fuel oil .....	7.18	5.38	13.32	16.34	19.67	23.22	30.92	5.3%
Natural gas .....	7.92	7.19	12.27	14.76	16.79	18.75	24.83	3.7%
Electricity .....	31.18	30.38	40.67	46.29	50.70	55.34	68.78	2.4%
<b>Industrial<sup>1</sup></b>								
Propane .....	12.26	11.49	16.22	18.73	22.27	26.56	36.21	3.4%
Distillate fuel oil.....	17.01	13.53	25.17	30.06	35.18	40.48	52.34	4.1%
Residual fuel oil .....	6.91	5.15	15.67	18.99	22.57	26.38	34.80	5.8%
Natural gas <sup>2</sup> .....	3.68	3.50	6.64	7.98	8.87	9.73	13.32	4.0%
Metallurgical coal.....	5.36	5.64	7.96	9.59	10.98	12.13	14.44	2.8%
Other industrial coal.....	3.36	3.34	4.19	4.66	5.12	5.65	7.19	2.3%
Coal to liquids.....	--	--	--	--	--	--	--	--
Electricity .....	20.25	20.36	26.75	30.80	33.90	37.29	47.22	2.5%
<b>Transportation</b>								
Propane .....	17.99	17.33	23.22	26.54	30.85	35.93	47.68	3.0%
E85 <sup>3</sup> .....	28.63	25.93	36.06	34.80	38.31	47.13	63.05	2.6%
Motor gasoline <sup>4</sup> .....	20.86	18.34	29.42	33.97	39.14	45.06	57.88	3.4%
Jet fuel <sup>5</sup> .....	12.04	9.75	21.39	25.97	30.85	36.24	48.41	4.8%
Diesel fuel (distillate fuel oil) <sup>6</sup> .....	19.78	16.80	31.14	36.79	42.61	48.58	62.23	3.9%
Residual fuel oil .....	7.95	5.96	14.17	17.39	20.89	24.73	33.08	5.2%
Natural gas <sup>7</sup> .....	16.20	16.45	19.89	21.43	22.88	24.75	31.63	1.9%
Electricity .....	30.18	29.68	47.63	54.46	59.26	64.34	78.72	2.9%
<b>Electric power<sup>8</sup></b>								
Distillate fuel oil.....	15.05	11.95	23.57	28.03	32.81	38.14	49.84	4.3%
Residual fuel oil .....	9.99	8.09	18.65	22.47	26.40	30.38	38.25	4.7%
Natural gas .....	3.24	3.02	5.82	7.15	8.05	8.92	12.41	4.2%
Steam coal.....	2.24	2.14	2.82	3.10	3.47	3.89	4.83	2.4%
Uranium .....	0.53	0.56	0.89	1.10	1.40	1.77	2.90	5.0%

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Average price to all users<sup>9</sup></b>								
Propane.....	14.63	14.05	19.29	22.09	25.85	30.32	40.52	3.2%
E85 <sup>3</sup> .....	28.63	25.93	36.06	34.80	38.31	47.13	63.05	2.6%
Motor gasoline <sup>4</sup> .....	20.85	18.33	29.42	33.97	39.14	45.06	57.88	3.4%
Jet fuel <sup>5</sup> .....	12.04	9.75	21.39	25.97	30.85	36.24	48.41	4.8%
Distillate fuel oil.....	19.16	15.98	29.61	35.01	40.61	46.41	59.68	4.0%
Residual fuel oil.....	8.50	6.19	14.49	17.69	21.16	24.93	33.13	5.1%
Natural gas.....	5.27	4.91	8.45	10.12	11.35	12.54	16.88	3.7%
Metallurgical coal.....	5.36	5.64	7.96	9.59	10.98	12.13	14.44	2.8%
Other coal.....	2.31	2.21	2.91	3.22	3.59	4.02	5.02	2.4%
Coal to liquids.....	--	--	--	--	--	--	--	--
Electricity.....	30.58	30.14	39.55	45.21	49.73	54.57	68.73	2.5%
<b>Non-renewable energy expenditures by sector (billion nominal dollars)</b>								
Residential.....	243	234	316	366	412	465	611	2.9%
Commercial.....	180	174	244	284	323	368	509	3.2%
Industrial <sup>1</sup> .....	169	158	300	356	417	491	689	4.4%
Transportation.....	514	450	736	814	922	1,075	1,496	3.6%
Total non-renewable expenditures.....	1,107	1,016	1,597	1,820	2,073	2,399	3,305	3.5%
Transportation renewable expenditures.....	1	1	2	5	7	7	10	7.9%
<b>Total expenditures.....</b>	<b>1,107</b>	<b>1,017</b>	<b>1,599</b>	<b>1,825</b>	<b>2,080</b>	<b>2,407</b>	<b>3,315</b>	<b>3.5%</b>

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

<sup>2</sup>Excludes use for lease and plant fuel.

<sup>3</sup>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.

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

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

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

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

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

<sup>9</sup>Weighted 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 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*, October 2016. 2015 residential, commercial, and industrial natural gas delivered prices: EIA, *Natural Gas Monthly*, December 2015). 2015 transportation sector natural gas delivered prices are model results. 2015 electric power sector distillate and residual fuel oil prices: EIA, *Monthly Energy Review*, October 2016. 2015 electric power sector natural gas prices: EIA, *Electric Power Monthly*, July 2016, Table 4.13.B, and EIA, *State Energy Data Report 2014*. 2015 coal prices based on: EIA, *Quarterly Coal Report, October-December 2015* and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. 2015 electricity prices: EIA, *Monthly Energy Review*, October 2016. 2015 E85 prices derived from monthly prices in the Clean Cities Alternative Fuel Price Report. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.



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

Key indicators and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Key indicators</b>								
<b>Households (millions)</b>								
Single-family .....	80.55	81.10	88.65	92.62	96.20	99.99	107.93	0.8%
Multifamily .....	28.87	29.11	32.35	34.26	36.18	38.09	41.52	1.0%
Mobile homes .....	5.97	5.84	5.36	5.15	4.93	4.81	4.56	-0.7%
<b>Total .....</b>	<b>115.38</b>	<b>116.06</b>	<b>126.36</b>	<b>132.03</b>	<b>137.31</b>	<b>142.89</b>	<b>154.01</b>	<b>0.8%</b>
<b>Average house square footage .....</b>	<b>1,695</b>	<b>1,703</b>	<b>1,772</b>	<b>1,806</b>	<b>1,838</b>	<b>1,869</b>	<b>1,933</b>	<b>0.4%</b>
<b>Energy intensity</b>								
<b>(million Btu per household)</b>								
Delivered energy consumption .....	95.1	91.5	85.1	81.0	77.9	75.2	70.2	-0.8%
Total energy consumption .....	178.0	172.4	157.1	148.4	142.6	138.0	127.4	-0.9%
<b>(thousand Btu per square foot)</b>								
Delivered energy consumption .....	56.1	53.7	48.0	44.8	42.4	40.3	36.3	-1.1%
Total energy consumption .....	105.0	101.2	88.6	82.2	77.6	73.8	65.9	-1.3%
<b>Delivered energy consumption by fuel</b>								
<b>Purchased electricity</b>								
Space heating .....	0.33	0.33	0.35	0.34	0.33	0.33	0.32	-0.1%
Space cooling .....	0.79	0.84	0.77	0.79	0.82	0.84	0.86	0.1%
Water heating .....	0.45	0.46	0.47	0.47	0.47	0.47	0.49	0.2%
Refrigeration .....	0.36	0.35	0.33	0.33	0.34	0.36	0.39	0.3%
Cooking .....	0.11	0.11	0.12	0.13	0.14	0.14	0.16	1.1%
Clothes dryers .....	0.20	0.21	0.22	0.23	0.24	0.26	0.28	0.9%
Freezers .....	0.08	0.07	0.07	0.07	0.06	0.06	0.07	-0.2%
Lighting .....	0.45	0.44	0.29	0.26	0.25	0.25	0.24	-1.8%
Clothes washers <sup>1</sup> .....	0.03	0.03	0.02	0.02	0.02	0.02	0.02	-1.0%
Dishwashers <sup>1</sup> .....	0.09	0.09	0.10	0.11	0.12	0.13	0.14	1.2%
Televisions and related equipment <sup>2</sup> .....	0.29	0.28	0.25	0.26	0.29	0.31	0.34	0.5%
Computers and related equipment <sup>3</sup> .....	0.11	0.11	0.08	0.07	0.06	0.05	0.04	-3.2%
Furnace fans and boiler circulation pumps .....	0.11	0.11	0.12	0.11	0.11	0.10	0.10	-0.2%
Other uses <sup>4</sup> .....	1.37	1.38	1.54	1.60	1.66	1.72	1.75	0.7%
<b>Delivered energy .....</b>	<b>4.78</b>	<b>4.81</b>	<b>4.72</b>	<b>4.78</b>	<b>4.90</b>	<b>5.05</b>	<b>5.19</b>	<b>0.2%</b>
<b>Natural gas</b>								
Space heating .....	3.02	2.82	3.01	2.96	2.93	2.91	2.85	0.0%
Space cooling .....	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.7%
Water heating .....	1.21	1.21	1.26	1.28	1.27	1.26	1.32	0.2%
Cooking .....	0.21	0.21	0.21	0.22	0.22	0.23	0.24	0.4%
Clothes dryers .....	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.7%
Other uses <sup>5</sup> .....	0.25	0.25	0.24	0.23	0.22	0.22	0.21	-0.5%
<b>Delivered energy .....</b>	<b>4.76</b>	<b>4.56</b>	<b>4.80</b>	<b>4.76</b>	<b>4.72</b>	<b>4.69</b>	<b>4.69</b>	<b>0.1%</b>
<b>Distillate fuel oil</b>								
Space heating .....	0.46	0.38	0.37	0.34	0.30	0.28	0.23	-1.4%
Water heating .....	0.04	0.04	0.02	0.02	0.02	0.01	0.01	-3.8%
Other uses <sup>6</sup> .....	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.6%
<b>Delivered energy .....</b>	<b>0.51</b>	<b>0.43</b>	<b>0.40</b>	<b>0.36</b>	<b>0.33</b>	<b>0.30</b>	<b>0.25</b>	<b>-1.6%</b>
<b>Propane</b>								
Space heating .....	0.34	0.30	0.30	0.29	0.27	0.26	0.24	-0.7%
Water heating .....	0.06	0.06	0.05	0.04	0.04	0.04	0.03	-1.8%
Cooking .....	0.03	0.03	0.03	0.02	0.02	0.02	0.02	-0.6%
Other uses <sup>6</sup> .....	0.04	0.05	0.05	0.06	0.06	0.06	0.07	1.4%
<b>Delivered energy .....</b>	<b>0.47</b>	<b>0.43</b>	<b>0.43</b>	<b>0.41</b>	<b>0.39</b>	<b>0.38</b>	<b>0.36</b>	<b>-0.5%</b>
Marketed renewables (wood) <sup>7</sup> .....	0.44	0.37	0.40	0.37	0.35	0.33	0.30	-0.6%
Kerosene .....	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-2.0%

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

Key indicators and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Delivered energy consumption by end use</b>								
Space heating.....	4.60	4.21	4.43	4.30	4.20	4.11	3.94	-0.2%
Space cooling.....	0.82	0.87	0.79	0.81	0.84	0.86	0.88	0.0%
Water heating.....	1.76	1.77	1.80	1.81	1.79	1.77	1.85	0.1%
Refrigeration.....	0.36	0.35	0.33	0.33	0.34	0.36	0.39	0.3%
Cooking.....	0.34	0.35	0.36	0.37	0.38	0.39	0.42	0.6%
Clothes dryers.....	0.26	0.26	0.28	0.29	0.30	0.32	0.34	0.9%
Freezers.....	0.08	0.07	0.07	0.07	0.06	0.06	0.07	-0.2%
Lighting.....	0.45	0.44	0.29	0.26	0.25	0.25	0.24	-1.8%
Clothes washers <sup>1</sup> .....	0.03	0.03	0.02	0.02	0.02	0.02	0.02	-1.0%
Dishwashers <sup>1</sup> .....	0.09	0.09	0.10	0.11	0.12	0.13	0.14	1.2%
Televisions and related equipment <sup>2</sup> .....	0.29	0.28	0.25	0.26	0.29	0.31	0.34	0.5%
Computers and related equipment <sup>3</sup> .....	0.11	0.11	0.08	0.07	0.06	0.05	0.04	-3.2%
Furnace fans and boiler circulation pumps.....	0.11	0.11	0.12	0.11	0.11	0.10	0.10	-0.2%
Other uses <sup>8</sup> .....	1.67	1.68	1.83	1.89	1.95	2.01	2.03	0.6%
<b>Delivered energy.....</b>	<b>10.97</b>	<b>10.62</b>	<b>10.75</b>	<b>10.69</b>	<b>10.70</b>	<b>10.75</b>	<b>10.80</b>	<b>0.1%</b>
<b>Electricity related losses.....</b>	<b>9.57</b>	<b>9.39</b>	<b>9.10</b>	<b>8.90</b>	<b>8.88</b>	<b>8.96</b>	<b>8.82</b>	<b>-0.2%</b>
<b>Total energy consumption by end use</b>								
Space heating.....	5.27	4.85	5.10	4.93	4.80	4.69	4.48	-0.2%
Space cooling.....	2.41	2.51	2.26	2.27	2.32	2.36	2.35	-0.2%
Water heating.....	2.67	2.66	2.71	2.69	2.64	2.60	2.67	0.0%
Refrigeration.....	1.07	1.04	0.97	0.94	0.96	0.99	1.06	0.1%
Cooking.....	0.56	0.56	0.60	0.61	0.63	0.65	0.69	0.6%
Clothes dryers.....	0.67	0.66	0.70	0.72	0.74	0.77	0.82	0.6%
Freezers.....	0.23	0.22	0.20	0.19	0.18	0.18	0.19	-0.5%
Lighting.....	1.35	1.30	0.84	0.76	0.70	0.69	0.65	-2.0%
Clothes washers <sup>1</sup> .....	0.08	0.08	0.05	0.05	0.05	0.05	0.05	-1.3%
Dishwashers <sup>1</sup> .....	0.28	0.28	0.30	0.32	0.33	0.35	0.39	1.0%
Televisions and related equipment <sup>2</sup> .....	0.87	0.83	0.74	0.74	0.80	0.87	0.91	0.3%
Computers and related equipment <sup>3</sup> .....	0.33	0.32	0.24	0.20	0.17	0.15	0.10	-3.5%
Furnace fans and boiler circulation pumps.....	0.34	0.32	0.35	0.32	0.30	0.29	0.28	-0.5%
Other uses <sup>8</sup> .....	4.42	4.38	4.80	4.86	4.95	5.07	5.00	0.4%
<b>Total.....</b>	<b>20.54</b>	<b>20.01</b>	<b>19.85</b>	<b>19.60</b>	<b>19.58</b>	<b>19.71</b>	<b>19.63</b>	<b>-0.1%</b>
<b>Nonmarketed renewables<sup>9</sup></b>								
Geothermal heat pumps.....	0.01	0.01	0.02	0.02	0.02	0.02	0.03	2.7%
Solar hot water heating.....	0.01	0.01	0.02	0.02	0.02	0.02	0.03	2.8%
Solar photovoltaic.....	0.08	0.11	0.41	0.64	0.94	1.32	2.50	9.7%
Wind.....	0.02	0.03	0.03	0.03	0.04	0.04	0.04	1.0%
<b>Total.....</b>	<b>0.12</b>	<b>0.16</b>	<b>0.47</b>	<b>0.71</b>	<b>1.02</b>	<b>1.41</b>	<b>2.60</b>	<b>8.6%</b>
<b>Heating degree days<sup>10</sup>.....</b>	<b>4,084</b>	<b>3,989</b>	<b>4,105</b>	<b>4,044</b>	<b>3,984</b>	<b>3,923</b>	<b>3,804</b>	<b>-0.1%</b>
<b>Cooling degree days<sup>10</sup>.....</b>	<b>1,489</b>	<b>1,528</b>	<b>1,518</b>	<b>1,568</b>	<b>1,619</b>	<b>1,670</b>	<b>1,774</b>	<b>0.4%</b>

<sup>1</sup>Does not include water heating portion of load.

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

<sup>3</sup>Includes desktop and laptop computers, monitors, and networking equipment.

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

<sup>5</sup>Includes such appliances as outdoor grills, exterior lights, pool heaters, spa heaters, and backup electricity generators.

<sup>6</sup>Includes such appliances as pool heaters, spa heaters, and backup electricity generators.

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

<sup>8</sup>Includes small electric devices, heating elements, outdoor grills, exterior lights, pool heaters, spa heaters, backup electricity generators, and motors not listed above. Electric vehicles are included in the transportation sector.

<sup>9</sup>Consumption determined by using the fossil fuel equivalent of 9,510 Btu per kilowatt-hour.

<sup>10</sup>See 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 consumption based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. 2015 degree days based on state-level data from the National Oceanic and Atmospheric Administration's Climatic Data Center and Climate Prediction Center. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Key indicators and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Key indicators</b>								
<b>Total floorspace (billion square feet)</b>								
Surviving.....	87.1	87.7	97.1	102.3	107.7	113.1	123.9	1.0%
New additions.....	1.8	2.0	2.3	2.3	2.4	2.4	2.6	0.8%
<b>Total.....</b>	<b>88.9</b>	<b>89.7</b>	<b>99.3</b>	<b>104.7</b>	<b>110.1</b>	<b>115.5</b>	<b>126.5</b>	<b>1.0%</b>
<b>Energy consumption intensity (thousand Btu per square foot)</b>								
Delivered energy consumption.....	97.6	97.7	88.2	84.6	82.3	81.1	80.9	-0.6%
Electricity related losses.....	104.5	100.9	89.7	83.2	79.0	76.8	74.4	-0.9%
Total energy consumption.....	202.1	198.6	177.9	167.8	161.4	157.9	155.2	-0.7%
<b>Delivered energy consumption by fuel</b>								
<b>Purchased electricity</b>								
Space heating <sup>1</sup> .....	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.0%
Space cooling <sup>1</sup> .....	0.54	0.55	0.49	0.49	0.49	0.49	0.50	-0.3%
Water heating <sup>1</sup> .....	0.02	0.02	0.02	0.01	0.01	0.01	0.01	-0.8%
Ventilation.....	0.52	0.52	0.49	0.44	0.40	0.38	0.36	-1.1%
Cooking.....	0.08	0.08	0.08	0.07	0.07	0.07	0.07	-0.7%
Lighting.....	0.52	0.51	0.41	0.37	0.33	0.30	0.26	-2.0%
Refrigeration.....	0.63	0.64	0.63	0.61	0.60	0.60	0.63	0.0%
Office equipment (PC).....	0.37	0.35	0.30	0.29	0.29	0.29	0.25	-1.0%
Office equipment (non-PC).....	0.22	0.23	0.26	0.29	0.31	0.34	0.41	1.7%
Other uses <sup>2</sup> .....	1.61	1.62	1.84	2.00	2.18	2.40	2.94	1.8%
<b>Delivered energy.....</b>	<b>4.63</b>	<b>4.64</b>	<b>4.62</b>	<b>4.68</b>	<b>4.80</b>	<b>4.99</b>	<b>5.53</b>	<b>0.5%</b>
<b>Natural gas</b>								
Space heating <sup>1</sup> .....	1.64	1.63	1.59	1.51	1.46	1.41	1.29	-0.7%
Space cooling <sup>1</sup> .....	0.03	0.03	0.02	0.02	0.02	0.02	0.02	-1.4%
Water heating <sup>1</sup> .....	0.30	0.31	0.30	0.30	0.31	0.31	0.32	0.1%
Cooking.....	0.31	0.32	0.34	0.36	0.38	0.40	0.44	1.0%
Other uses <sup>3</sup> .....	1.03	0.94	0.99	1.08	1.20	1.35	1.72	1.8%
<b>Delivered energy.....</b>	<b>3.30</b>	<b>3.23</b>	<b>3.24</b>	<b>3.27</b>	<b>3.36</b>	<b>3.48</b>	<b>3.79</b>	<b>0.5%</b>
<b>Distillate fuel oil</b>								
Space heating <sup>1</sup> .....	0.24	0.24	0.22	0.21	0.20	0.19	0.17	-1.0%
Water heating <sup>1</sup> .....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
Other uses <sup>4</sup> .....	0.10	0.16	0.18	0.17	0.17	0.17	0.18	0.3%
<b>Delivered energy.....</b>	<b>0.34</b>	<b>0.41</b>	<b>0.40</b>	<b>0.39</b>	<b>0.38</b>	<b>0.37</b>	<b>0.35</b>	<b>-0.4%</b>
Marketed renewables (biomass).....	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0%
Other fuels <sup>5</sup> .....	0.26	0.36	0.37	0.38	0.39	0.40	0.43	0.5%
<b>Delivered energy consumption by end use</b>								
Space heating <sup>1</sup> .....	2.00	1.99	1.92	1.84	1.77	1.71	1.58	-0.7%
Space cooling <sup>1</sup> .....	0.57	0.58	0.51	0.51	0.51	0.51	0.52	-0.3%
Water heating <sup>1</sup> .....	0.32	0.32	0.32	0.32	0.32	0.33	0.34	0.1%
Ventilation.....	0.52	0.52	0.49	0.44	0.40	0.38	0.36	-1.1%
Cooking.....	0.39	0.40	0.42	0.43	0.45	0.47	0.51	0.7%
Lighting.....	0.52	0.51	0.41	0.37	0.33	0.30	0.26	-2.0%
Refrigeration.....	0.63	0.64	0.63	0.61	0.60	0.60	0.63	0.0%
Office equipment (PC).....	0.37	0.35	0.30	0.29	0.29	0.29	0.25	-1.0%
Office equipment (non-PC).....	0.22	0.23	0.26	0.29	0.31	0.34	0.41	1.7%
Other uses <sup>6</sup> .....	3.13	3.22	3.51	3.77	4.08	4.45	5.40	1.5%
<b>Delivered energy.....</b>	<b>8.67</b>	<b>8.77</b>	<b>8.76</b>	<b>8.85</b>	<b>9.06</b>	<b>9.37</b>	<b>10.23</b>	<b>0.5%</b>

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

Key indicators and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Electricity related losses</b> .....	<b>9.29</b>	<b>9.06</b>	<b>8.91</b>	<b>8.71</b>	<b>8.70</b>	<b>8.87</b>	<b>9.41</b>	<b>0.1%</b>
<b>Total energy consumption by end use</b>								
Space heating <sup>1</sup> .....	2.24	2.22	2.14	2.04	1.98	1.91	1.77	-0.7%
Space cooling <sup>1</sup> .....	1.64	1.66	1.47	1.42	1.40	1.38	1.37	-0.6%
Water heating <sup>1</sup> .....	0.35	0.36	0.35	0.34	0.35	0.35	0.36	0.0%
Ventilation.....	1.56	1.53	1.43	1.25	1.13	1.05	0.96	-1.4%
Cooking.....	0.56	0.56	0.56	0.57	0.58	0.59	0.62	0.3%
Lighting.....	1.57	1.51	1.19	1.05	0.92	0.83	0.70	-2.2%
Refrigeration.....	1.90	1.89	1.84	1.75	1.68	1.67	1.70	-0.3%
Office equipment (PC).....	1.10	1.05	0.87	0.83	0.82	0.81	0.67	-1.3%
Office equipment (non-PC).....	0.68	0.68	0.76	0.82	0.88	0.93	1.10	1.4%
Other uses <sup>6</sup> .....	6.35	6.38	7.06	7.49	8.04	8.71	10.39	1.4%
<b>Total</b> .....	<b>17.96</b>	<b>17.82</b>	<b>17.67</b>	<b>17.56</b>	<b>17.77</b>	<b>18.24</b>	<b>19.64</b>	<b>0.3%</b>
<b>Nonmarketed renewable fuels<sup>7</sup></b>								
Solar thermal.....	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.4%
Solar photovoltaic.....	0.08	0.08	0.17	0.24	0.33	0.44	0.67	6.3%
Wind.....	0.01	0.01	0.01	0.01	0.01	0.02	0.03	4.9%
<b>Total</b> .....	<b>0.15</b>	<b>0.16</b>	<b>0.26</b>	<b>0.32</b>	<b>0.42</b>	<b>0.53</b>	<b>0.78</b>	<b>4.7%</b>
<b>Heating degree days</b>								
New England.....	6,514	5,995	6,065	5,980	5,895	5,809	5,637	-0.2%
Middle Atlantic.....	5,774	5,442	5,483	5,412	5,341	5,271	5,132	-0.2%
East North Central.....	6,169	5,913	6,210	6,193	6,177	6,160	6,127	0.1%
West North Central.....	6,093	6,067	6,517	6,510	6,504	6,496	6,479	0.2%
South Atlantic.....	2,487	2,591	2,551	2,513	2,475	2,439	2,369	-0.3%
East South Central.....	3,217	3,316	3,413	3,404	3,395	3,386	3,368	0.0%
West South Central.....	2,089	1,903	2,033	2,006	1,980	1,955	1,904	0.0%
Mountain.....	4,602	4,670	4,826	4,770	4,709	4,647	4,522	-0.1%
Pacific.....	2,889	2,941	3,294	3,260	3,226	3,193	3,124	0.2%
<b>United States</b> .....	<b>4,084</b>	<b>3,989</b>	<b>4,105</b>	<b>4,044</b>	<b>3,984</b>	<b>3,923</b>	<b>3,804</b>	<b>-0.1%</b>
<b>Cooling degree days</b>								
New England.....	558	631	591	620	649	678	737	0.5%
Middle Atlantic.....	804	898	815	847	880	912	976	0.2%
East North Central.....	728	947	782	792	801	810	829	-0.4%
West North Central.....	940	1,056	978	987	997	1,007	1,027	-0.1%
South Atlantic.....	2,403	2,367	2,261	2,305	2,350	2,394	2,481	0.1%
East South Central.....	1,723	1,902	1,719	1,743	1,768	1,792	1,840	-0.1%
West South Central.....	2,745	2,769	2,898	2,970	3,041	3,113	3,257	0.5%
Mountain.....	1,480	1,477	1,587	1,635	1,686	1,739	1,845	0.7%
Pacific.....	1,074	926	1,027	1,071	1,115	1,158	1,245	0.9%
<b>United States</b> .....	<b>1,489</b>	<b>1,528</b>	<b>1,518</b>	<b>1,568</b>	<b>1,619</b>	<b>1,670</b>	<b>1,774</b>	<b>0.4%</b>

<sup>1</sup>Includes fuel consumption for district services.

<sup>2</sup>Includes (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.

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

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

<sup>5</sup>Includes residual fuel oil, propane, coal, motor gasoline, and kerosene.

<sup>6</sup>Includes (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).

<sup>7</sup>Consumption determined by using the fossil fuel equivalent of 9,510 Btu per kilowatt-hour.

Btu = British thermal unit.

PC = Personal computer.

Note: Totals may not equal sum of components due to independent rounding. Data for 2015 are model results and may differ from official EIA data reports.

**Sources:** 2015 consumption based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. 2015 degree days based on state-level data from the National Oceanic and Atmospheric Administration's Climatic Data Center and Climate Prediction Center. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. **Projections:** EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

**Table A6. Industrial sector key indicators and consumption**

Shipments, prices, and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Key indicators</b>								
<b>Value of shipments (billion 2009 dollars)</b>								
Manufacturing .....	5,325	5,374	6,602	7,016	7,674	8,512	10,441	2.0%
Agriculture, mining, and construction .....	2,049	2,079	2,545	2,639	2,802	2,978	3,395	1.5%
<b>Total .....</b>	<b>7,374</b>	<b>7,453</b>	<b>9,147</b>	<b>9,655</b>	<b>10,476</b>	<b>11,491</b>	<b>13,836</b>	<b>1.8%</b>
<b>Energy prices</b>								
(2016 dollars per million Btu)								
Propane .....	12.43	11.49	13.41	13.87	14.92	16.20	17.89	1.3%
Motor gasoline .....	20.67	17.87	24.35	25.20	26.29	27.55	28.69	1.4%
Distillate fuel oil .....	17.25	13.53	20.80	22.25	23.57	24.69	25.86	1.9%
Residual fuel oil .....	7.01	5.15	12.95	14.05	15.12	16.09	17.20	3.6%
Asphalt and road oil .....	3.53	2.51	9.91	10.77	11.58	12.41	13.28	5.0%
Natural gas heat and power .....	3.40	3.23	5.31	5.72	5.76	5.75	6.41	2.0%
Natural gas feedstocks .....	4.04	3.73	5.63	6.06	6.10	6.09	6.75	1.8%
Metallurgical coal .....	5.43	5.64	6.58	7.10	7.36	7.40	7.13	0.7%
Other industrial coal .....	3.40	3.34	3.46	3.45	3.43	3.45	3.55	0.2%
Coal to liquids .....	--	--	--	--	--	--	--	--
Electricity .....	20.54	20.36	22.10	22.80	22.71	22.74	23.33	0.4%
(nominal dollars per million Btu)								
Propane .....	12.26	11.49	16.22	18.73	22.27	26.56	36.21	3.4%
Motor gasoline .....	20.39	17.87	29.46	34.05	39.25	45.18	58.06	3.5%
Distillate fuel oil .....	17.01	13.53	25.17	30.06	35.18	40.48	52.34	4.1%
Residual fuel oil .....	6.91	5.15	15.67	18.99	22.57	26.38	34.80	5.8%
Asphalt and road oil .....	3.48	2.51	11.99	14.55	17.28	20.35	26.88	7.2%
Natural gas heat and power .....	3.35	3.23	6.43	7.73	8.60	9.44	12.98	4.2%
Natural gas feedstocks .....	3.98	3.73	6.81	8.19	9.11	9.99	13.65	3.9%
Metallurgical coal .....	5.36	5.64	7.96	9.59	10.98	12.13	14.44	2.8%
Other industrial coal .....	3.36	3.34	4.19	4.66	5.12	5.65	7.19	2.3%
Coal to liquids .....	--	--	--	--	--	--	--	--
Electricity .....	20.25	20.36	26.75	30.80	33.90	37.29	47.22	2.5%
<b>Energy consumption (quadrillion Btu)<sup>1</sup></b>								
<b>Industrial consumption excluding refining</b>								
Propane heat and power .....	0.50	0.41	0.40	0.40	0.41	0.42	0.44	0.2%
Liquefied petroleum gas and other feedstocks <sup>2</sup> ..	1.99	2.07	2.87	2.98	3.10	3.24	3.38	1.4%
Motor gasoline .....	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.2%
Distillate fuel oil .....	1.33	1.29	1.54	1.55	1.58	1.63	1.75	0.9%
Residual fuel oil .....	0.04	0.05	0.05	0.05	0.05	0.04	0.05	-0.1%
Petrochemical feedstocks .....	0.66	0.66	0.98	1.02	1.07	1.13	1.19	1.8%
Petroleum coke .....	0.15	0.16	0.15	0.15	0.15	0.15	0.16	0.0%
Asphalt and road oil .....	0.83	0.86	0.91	1.00	1.13	1.25	1.56	1.7%
Miscellaneous petroleum <sup>3</sup> .....	0.43	0.43	0.40	0.39	0.39	0.40	0.42	-0.1%
Petroleum and other liquids subtotal .....	6.14	6.16	7.52	7.76	8.09	8.49	9.19	1.2%
Natural gas heat and power .....	5.63	5.75	6.57	6.61	6.80	7.08	7.72	0.9%
Natural gas feedstocks .....	0.72	0.81	1.23	1.24	1.25	1.28	1.28	1.3%
Lease and plant fuel <sup>4</sup> .....	1.63	1.62	1.79	1.86	1.92	1.98	2.09	0.8%
Natural gas liquefaction for export <sup>5</sup> .....	0.00	0.02	0.38	0.42	0.46	0.46	0.46	10.3%
Natural gas subtotal .....	7.98	8.19	9.97	10.13	10.43	10.80	11.55	1.0%
Metallurgical coal and coke <sup>6</sup> .....	0.54	0.52	0.43	0.40	0.34	0.29	0.21	-2.7%
Other industrial coal .....	0.74	0.71	0.75	0.71	0.67	0.66	0.66	-0.2%
Coal subtotal .....	1.28	1.23	1.19	1.11	1.01	0.95	0.87	-1.0%
Renewables <sup>7</sup> .....	1.49	1.45	1.60	1.62	1.64	1.70	1.84	0.7%
Purchased electricity .....	3.07	3.03	3.61	3.60	3.66	3.78	4.04	0.8%
<b>Delivered energy .....</b>	<b>19.96</b>	<b>20.06</b>	<b>23.88</b>	<b>24.21</b>	<b>24.83</b>	<b>25.72</b>	<b>27.48</b>	<b>0.9%</b>
Electricity related losses .....	6.16	5.91	6.96	6.70	6.64	6.72	6.86	0.4%
<b>Total .....</b>	<b>26.12</b>	<b>25.98</b>	<b>30.84</b>	<b>30.91</b>	<b>31.47</b>	<b>32.44</b>	<b>34.35</b>	<b>0.8%</b>

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

Shipments, prices, and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Refining consumption</b>								
Liquefied petroleum gas heat and power <sup>2</sup> .....	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 .....	0.52	0.46	0.37	0.39	0.38	0.37	0.36	-0.7%
Still gas .....	1.46	1.50	1.74	1.72	1.69	1.70	1.69	0.4%
Miscellaneous petroleum <sup>3</sup> .....	0.01	0.01	0.00	0.00	0.00	0.00	0.00	-16.7%
Petroleum and other liquids subtotal .....	2.00	1.98	2.11	2.11	2.07	2.07	2.05	0.1%
Natural gas heat and power .....	1.25	1.20	1.08	1.00	1.03	1.08	1.10	-0.3%
Natural gas feedstocks .....	0.18	0.18	0.30	0.27	0.30	0.33	0.33	1.8%
Natural-gas-to-liquids heat and power .....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Natural gas subtotal .....	1.43	1.39	1.38	1.27	1.33	1.41	1.44	0.1%
Other industrial coal .....	0.02	0.02	0.00	0.00	0.00	0.00	0.00	--
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	0.00	0.00	0.00	0.00	0.00	--
Biofuels heat and coproducts .....	0.85	0.90	0.86	0.85	0.84	0.84	0.80	-0.3%
Purchased electricity .....	0.20	0.20	0.19	0.18	0.18	0.18	0.18	-0.2%
<b>Delivered energy</b> .....	<b>4.49</b>	<b>4.49</b>	<b>4.54</b>	<b>4.41</b>	<b>4.41</b>	<b>4.50</b>	<b>4.47</b>	<b>0.0%</b>
Electricity related losses .....	0.39	0.38	0.36	0.33	0.32	0.32	0.31	-0.6%
<b>Total</b> .....	<b>4.89</b>	<b>4.87</b>	<b>4.90</b>	<b>4.73</b>	<b>4.73</b>	<b>4.83</b>	<b>4.78</b>	<b>-0.1%</b>
<b>Total industrial sector consumption</b>								
Liquefied petroleum gas heat and power <sup>2</sup> .....	0.51	0.42	0.40	0.40	0.41	0.42	0.44	0.1%
Liquefied petroleum gas and other feedstocks <sup>2</sup> ..	1.99	2.07	2.87	2.98	3.10	3.24	3.38	1.4%
Motor gasoline .....	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.2%
Distillate fuel oil .....	1.34	1.29	1.54	1.55	1.58	1.63	1.75	0.9%
Residual fuel oil .....	0.04	0.05	0.05	0.05	0.05	0.04	0.05	-0.2%
Petrochemical feedstocks .....	0.66	0.66	0.98	1.02	1.07	1.13	1.19	1.8%
Petroleum coke .....	0.66	0.63	0.52	0.53	0.53	0.52	0.52	-0.5%
Asphalt and road oil .....	0.83	0.86	0.91	1.00	1.13	1.25	1.56	1.7%
Still gas .....	1.46	1.50	1.74	1.72	1.69	1.70	1.69	0.4%
Miscellaneous petroleum <sup>3</sup> .....	0.44	0.43	0.40	0.39	0.39	0.40	0.42	-0.1%
Petroleum and other liquids subtotal .....	8.14	8.14	9.63	9.87	10.16	10.56	11.24	1.0%
Natural gas heat and power .....	6.88	6.95	7.65	7.61	7.83	8.16	8.83	0.7%
Natural gas feedstocks .....	0.90	0.99	1.52	1.51	1.55	1.61	1.61	1.4%
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 <sup>4</sup> .....	1.63	1.62	1.79	1.86	1.92	1.98	2.09	0.8%
Natural gas liquefaction for export <sup>5</sup> .....	0.00	0.02	0.38	0.42	0.46	0.46	0.46	10.3%
Natural gas subtotal .....	9.41	9.58	11.34	11.40	11.75	12.21	12.98	0.9%
Metallurgical coal and coke <sup>6</sup> .....	0.54	0.52	0.43	0.40	0.34	0.29	0.21	-2.7%
Other industrial coal .....	0.76	0.73	0.75	0.71	0.67	0.66	0.66	-0.3%
Coal-to-liquids heat and power .....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Coal subtotal .....	1.31	1.25	1.19	1.11	1.01	0.95	0.87	-1.1%
Biofuels heat and coproducts .....	0.85	0.90	0.86	0.85	0.84	0.84	0.80	-0.3%
Renewables <sup>7</sup> .....	1.49	1.45	1.60	1.62	1.64	1.70	1.84	0.7%
Purchased electricity .....	3.27	3.23	3.80	3.78	3.84	3.96	4.22	0.8%
<b>Delivered energy</b> .....	<b>24.45</b>	<b>24.55</b>	<b>28.42</b>	<b>28.62</b>	<b>29.24</b>	<b>30.23</b>	<b>31.95</b>	<b>0.8%</b>
Electricity related losses .....	6.55	6.30	7.32	7.03	6.96	7.04	7.17	0.4%
<b>Total</b> .....	<b>31.01</b>	<b>30.85</b>	<b>35.74</b>	<b>35.65</b>	<b>36.21</b>	<b>37.27</b>	<b>39.12</b>	<b>0.7%</b>

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

Key indicators and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Energy consumption per dollar of shipments (thousand Btu per 2009 dollar)</b>								
Petroleum and other liquids .....	1.10	1.09	1.05	1.02	0.97	0.92	0.81	-0.9%
Natural gas .....	1.28	1.29	1.24	1.18	1.12	1.06	0.94	-0.9%
Coal .....	0.18	0.17	0.13	0.11	0.10	0.08	0.06	-2.8%
Renewable fuels <sup>7</sup> .....	0.32	0.32	0.27	0.26	0.24	0.22	0.19	-1.5%
Purchased electricity .....	0.44	0.43	0.42	0.39	0.37	0.34	0.30	-1.0%
<b>Delivered energy .....</b>	<b>3.32</b>	<b>3.29</b>	<b>3.11</b>	<b>2.96</b>	<b>2.79</b>	<b>2.63</b>	<b>2.31</b>	<b>-1.0%</b>
<b>Industrial combined heat and power<sup>1</sup></b>								
Capacity (gigawatts) .....	26.1	26.2	28.9	30.8	33.1	35.9	41.9	1.4%
Generation (billion kilowatthours).....	139	140	165	174	187	202	234	1.5%

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

<sup>2</sup>Includes ethane, natural gasoline, and refinery olefins.

<sup>3</sup>Includes lubricants and miscellaneous petroleum products.

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

<sup>5</sup>Fuel used in facilities that liquefy natural gas for export.

<sup>6</sup>Includes net coal coke imports.

<sup>7</sup>Includes 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 prices for motor gasoline and distillate fuel oil are based on: U.S. Energy Information Administration (EIA), *Petroleum Marketing Monthly*, October 2016. 2015 petrochemical feedstock and asphalt and road oil prices are based on: EIA, *State Energy Data Report 2014*. 2015 coal prices are based on: EIA, *Quarterly Coal Report, October-December 2015* and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. 2015 electricity prices: EIA, *Monthly Energy Review*, October 2016. 2015 natural gas prices: *Natural Gas Monthly*, December 2015). 2015 refining consumption based on: *Petroleum Supply Annual 2015*. Other 2015 consumption values are based on: EIA, *Monthly Energy Review*, October 2016. 2015 shipments: IHS Markit, Industry model, August 2016. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

**Table A7. Transportation sector key indicators and delivered energy consumption**

Key indicators and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Key indicators</b>								
<b>Travel indicators</b>								
(billion vehicle miles traveled)								
Light-duty vehicles less than 8,501 pounds ....	2,755	2,841	3,060	3,136	3,225	3,331	3,567	0.7%
Commercial light trucks <sup>1</sup> .....	95	97	115	120	129	139	163	1.5%
Freight trucks greater than 10,000 pounds .....	279	276	322	332	350	374	427	1.3%
(billion seat miles available)								
Air .....	1,090	1,088	1,364	1,519	1,683	1,873	2,275	2.2%
(billion ton miles traveled)								
Rail .....	1,849	1,804	2,142	2,160	2,168	2,205	2,366	0.8%
Domestic shipping .....	495	482	415	352	319	283	251	-1.9%
<b>Energy efficiency indicators</b>								
(miles per gallon)								
New light-duty vehicle CAFE standard <sup>2</sup> .....	30.6	31.5	43.7	43.9	44.0	44.1	44.1	1.0%
New car <sup>2</sup> .....	35.5	36.9	53.1	53.1	53.1	53.1	53.1	1.1%
New light truck <sup>2</sup> .....	27.3	28.5	38.4	38.4	38.4	38.4	38.4	0.9%
Compliance new light-duty vehicle <sup>3</sup> .....	31.9	31.8	44.4	45.0	45.3	45.4	45.3	1.0%
New car <sup>3</sup> .....	38.8	38.3	54.8	55.4	55.4	55.5	55.3	1.1%
New light truck <sup>3</sup> .....	27.6	28.3	38.7	39.1	39.2	39.2	39.1	1.0%
Tested new light-duty vehicle <sup>4</sup> .....	31.0	31.0	44.3	45.0	45.3	45.4	45.3	1.1%
New car <sup>4</sup> .....	38.3	37.8	54.8	55.4	55.4	55.5	55.3	1.1%
New light truck <sup>4</sup> .....	26.6	27.5	38.7	39.0	39.2	39.2	39.1	1.0%
On-road new light-duty vehicle <sup>5</sup> .....	25.0	25.0	35.7	36.3	36.5	36.6	36.5	1.1%
New car <sup>5</sup> .....	31.3	30.9	44.8	45.3	45.2	45.3	45.2	1.1%
New light truck <sup>5</sup> .....	21.3	22.0	30.9	31.3	31.4	31.4	31.3	1.0%
Light-duty stock <sup>6</sup> .....	21.8	22.2	26.8	30.3	32.9	34.6	35.8	1.4%
New commercial light truck <sup>1</sup> .....	13.0	13.1	19.5	20.5	20.5	20.6	20.6	1.3%
Stock commercial light truck <sup>1</sup> .....	13.9	13.8	16.8	18.1	19.1	19.8	20.3	1.1%
Freight truck .....	7.0	7.0	8.0	8.8	9.6	10.0	10.3	1.1%
(seat miles per gallon)								
Aircraft .....	66.7	66.7	69.0	70.9	72.9	74.9	79.1	0.5%
(ton miles per thousand Btu)								
Rail .....	3.4	3.5	3.7	3.8	4.0	4.1	4.5	0.8%
Domestic shipping .....	4.9	4.9	5.4	5.6	5.9	6.2	6.8	0.9%
<b>Energy use by mode</b>								
<b>(quadrillion Btu)</b>								
Light-duty vehicles .....	15.78	16.03	14.22	12.93	12.25	12.05	12.48	-0.7%
Commercial light trucks <sup>1</sup> .....	0.86	0.88	0.85	0.83	0.84	0.88	1.01	0.4%
Bus transportation .....	0.26	0.26	0.28	0.29	0.30	0.31	0.32	0.6%
Freight trucks .....	5.55	5.47	5.72	5.41	5.30	5.47	6.20	0.4%
Rail, passenger .....	0.04	0.04	0.05	0.05	0.06	0.06	0.06	1.1%
Rail, freight .....	0.54	0.52	0.58	0.56	0.54	0.53	0.53	0.0%
Shipping, domestic .....	0.10	0.10	0.08	0.06	0.05	0.05	0.04	-2.9%
Shipping, international .....	0.68	0.81	0.73	0.78	0.84	0.88	0.96	0.5%
Recreational boats .....	0.25	0.25	0.28	0.29	0.30	0.31	0.32	0.7%
Air .....	2.36	2.36	2.83	3.06	3.29	3.54	4.05	1.6%
Military use .....	0.65	0.66	0.64	0.67	0.71	0.76	0.88	0.9%
Lubricants .....	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.1%
Pipeline fuel .....	0.69	0.69	0.71	0.73	0.76	0.78	0.83	0.6%
<b>Total .....</b>	<b>27.89</b>	<b>28.21</b>	<b>27.10</b>	<b>25.80</b>	<b>25.38</b>	<b>25.77</b>	<b>27.82</b>	<b>0.0%</b>



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

Key indicators and consumption	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Energy use by mode</b>								
<b>(million barrels per day oil equivalent)</b>								
Light-duty vehicles.....	8.55	8.69	7.71	7.02	6.66	6.55	6.79	-0.7%
Commercial light trucks <sup>1</sup> .....	0.45	0.46	0.45	0.44	0.44	0.46	0.54	0.4%
Bus transportation.....	0.13	0.13	0.14	0.14	0.14	0.15	0.16	0.6%
Freight trucks.....	2.67	2.63	2.76	2.61	2.56	2.65	3.00	0.4%
Rail, passenger.....	0.02	0.02	0.02	0.03	0.03	0.03	0.03	1.1%
Rail, freight.....	0.26	0.25	0.27	0.27	0.26	0.25	0.25	0.0%
Shipping, domestic.....	0.05	0.05	0.04	0.03	0.03	0.02	0.02	-2.8%
Shipping, international.....	0.31	0.36	0.32	0.35	0.38	0.39	0.43	0.5%
Recreational boats.....	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.8%
Air.....	1.14	1.14	1.37	1.48	1.59	1.71	1.96	1.6%
Military use.....	0.31	0.31	0.31	0.32	0.34	0.36	0.42	0.9%
Lubricants.....	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.1%
Pipeline fuel.....	0.33	0.33	0.34	0.35	0.36	0.37	0.39	0.6%
<b>Total.....</b>	<b>14.40</b>	<b>14.56</b>	<b>13.94</b>	<b>13.25</b>	<b>13.01</b>	<b>13.18</b>	<b>14.23</b>	<b>-0.1%</b>

<sup>1</sup>Commercial trucks 8,501 to 10,000 pounds gross vehicle weight rating.

<sup>2</sup>CAFE standard based on projected new vehicle sales.

<sup>3</sup>Includes CAFE credits for alternative fueled vehicle sales and credit banking.

<sup>4</sup>Environmental Protection Agency rated miles per gallon.

<sup>5</sup>Tested new vehicle efficiency revised for on-road performance.

<sup>6</sup>Combined "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 2015 are model results and may differ from official EIA data reports.

Sources: 2015: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016; EIA, *Alternatives to Traditional Transportation Fuels 2009* (Part II - User and Fuel Data), April 2011; Federal Highway Administration, *Highway Statistics 2014*; Oak Ridge National Laboratory, *Transportation Energy Data Book: Edition 34*; 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; 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 Fuel Supply Center, Factbook, January 2010. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Supply, disposition, prices, and emissions	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Net generation by fuel type</b>								
<b>Electric power sector<sup>1</sup></b>								
<b>Power only<sup>2</sup></b>								
Coal .....	1,323	1,197	1,172	992	950	915	852	-1.0%
Petroleum .....	24	19	11	9	8	7	6	-3.5%
Natural gas <sup>3</sup> .....	1,110	1,169	1,012	1,208	1,350	1,473	1,738	1.2%
Nuclear power .....	797	798	773	768	721	702	608	-0.8%
Pumped storage/other <sup>4</sup> .....	2	3	3	3	3	3	3	0.1%
Renewable sources <sup>5</sup> .....	507	554	933	987	1,045	1,134	1,317	2.6%
Distributed generation (natural gas) .....	0	0	0	0	1	2	4	--
<b>Total .....</b>	<b>3,764</b>	<b>3,740</b>	<b>3,906</b>	<b>3,967</b>	<b>4,079</b>	<b>4,236</b>	<b>4,529</b>	<b>0.6%</b>
<b>Combined heat and power<sup>6</sup></b>								
Coal .....	17	22	20	20	20	20	20	-0.3%
Petroleum .....	2	1	1	1	1	1	1	0.0%
Natural gas .....	131	144	139	139	139	139	137	-0.2%
Renewable sources .....	4	5	5	5	5	5	5	0.0%
<b>Total .....</b>	<b>158</b>	<b>171</b>	<b>165</b>	<b>165</b>	<b>164</b>	<b>164</b>	<b>162</b>	<b>-0.2%</b>
<b>Total net electric power sector generation.....</b>	<b>3,921</b>	<b>3,911</b>	<b>4,071</b>	<b>4,132</b>	<b>4,243</b>	<b>4,400</b>	<b>4,691</b>	<b>0.5%</b>
Less direct use.....	17	21	20	20	20	20	20	-0.1%
<b>Net available to the grid .....</b>	<b>3,904</b>	<b>3,890</b>	<b>4,050</b>	<b>4,112</b>	<b>4,223</b>	<b>4,380</b>	<b>4,670</b>	<b>0.5%</b>
<b>End-use sector<sup>7</sup></b>								
Coal .....	14	14	13	12	11	11	10	-1.1%
Petroleum .....	1	1	1	1	1	1	1	-1.2%
Natural gas .....	100	102	130	151	176	205	271	2.9%
Other gaseous fuels <sup>8</sup> .....	11	11	21	20	20	20	21	1.8%
Renewable sources <sup>9</sup> .....	49	53	93	122	163	215	366	5.8%
Other <sup>10</sup> .....	3	3	3	3	3	3	3	0.0%
<b>Total end-use sector net generation .....</b>	<b>178</b>	<b>185</b>	<b>260</b>	<b>310</b>	<b>375</b>	<b>456</b>	<b>671</b>	<b>3.9%</b>
Less direct use.....	129	135	213	257	316	387	567	4.3%
<b>Total sales to the grid.....</b>	<b>50</b>	<b>50</b>	<b>47</b>	<b>52</b>	<b>59</b>	<b>69</b>	<b>105</b>	<b>2.2%</b>
<b>Total net electricity generation by fuel</b>								
Coal .....	1,354	1,233	1,205	1,024	981	946	882	-1.0%
Petroleum .....	28	21	13	10	10	9	7	-3.1%
Natural gas .....	1,341	1,414	1,282	1,499	1,666	1,818	2,150	1.2%
Nuclear power.....	797	798	773	768	721	702	608	-0.8%
Renewable sources <sup>5,9</sup> .....	560	612	1,031	1,114	1,213	1,354	1,687	3.0%
Other <sup>11</sup> .....	20	17	27	27	26	27	27	1.3%
<b>Total net electricity generation.....</b>	<b>4,100</b>	<b>4,096</b>	<b>4,331</b>	<b>4,442</b>	<b>4,618</b>	<b>4,856</b>	<b>5,362</b>	<b>0.8%</b>
<b>Net generation to the grid.....</b>	<b>3,954</b>	<b>3,940</b>	<b>4,097</b>	<b>4,164</b>	<b>4,282</b>	<b>4,449</b>	<b>4,775</b>	<b>0.6%</b>
<b>Net imports.....</b>	<b>66</b>	<b>57</b>	<b>57</b>	<b>50</b>	<b>45</b>	<b>42</b>	<b>41</b>	<b>-0.9%</b>
<b>Electricity sales by sector</b>								
Residential.....	1,400	1,410	1,383	1,402	1,436	1,479	1,521	0.2%
Commercial .....	1,358	1,360	1,354	1,372	1,407	1,463	1,622	0.5%
Industrial.....	959	946	1,113	1,107	1,126	1,162	1,236	0.8%
Transportation.....	9	11	42	65	83	98	120	7.4%
<b>Total .....</b>	<b>3,726</b>	<b>3,727</b>	<b>3,892</b>	<b>3,947</b>	<b>4,052</b>	<b>4,202</b>	<b>4,499</b>	<b>0.6%</b>
Direct use .....	146	156	233	278	336	407	587	4.0%
<b>Total electricity use .....</b>	<b>3,872</b>	<b>3,882</b>	<b>4,125</b>	<b>4,225</b>	<b>4,388</b>	<b>4,609</b>	<b>5,086</b>	<b>0.8%</b>

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

Supply, disposition, prices, and emissions	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>End-use prices</b>								
(2016 cents per kilowatthour)								
Residential.....	12.8	12.4	13.7	13.9	13.9	13.9	14.4	0.4%
Commercial.....	10.8	10.4	11.5	11.7	11.6	11.5	11.6	0.3%
Industrial.....	7.0	6.9	7.5	7.8	7.7	7.8	8.0	0.4%
Transportation.....	10.4	10.1	13.4	13.8	13.5	13.4	13.3	0.8%
<b>All sectors average.....</b>	<b>10.6</b>	<b>10.3</b>	<b>11.2</b>	<b>11.4</b>	<b>11.4</b>	<b>11.4</b>	<b>11.6</b>	<b>0.4%</b>
(nominal cents per kilowatthour)								
Residential.....	12.7	12.4	16.6	18.8	20.7	22.8	29.1	2.5%
Commercial.....	10.6	10.4	13.9	15.8	17.3	18.9	23.5	2.4%
Industrial.....	6.9	6.9	9.1	10.5	11.6	12.7	16.1	2.5%
Transportation.....	10.3	10.1	16.3	18.6	20.2	22.0	26.9	2.9%
<b>All sectors average.....</b>	<b>10.4</b>	<b>10.3</b>	<b>13.5</b>	<b>15.4</b>	<b>17.0</b>	<b>18.6</b>	<b>23.5</b>	<b>2.5%</b>
<b>Prices by service category</b>								
(2016 cents per kilowatthour)								
Generation.....	6.5	5.9	6.6	7.1	6.9	6.8	7.2	0.6%
Transmission.....	1.1	1.1	1.3	1.3	1.4	1.4	1.4	0.6%
Distribution.....	2.9	3.3	3.3	3.1	3.2	3.2	3.2	-0.1%
(nominal cents per kilowatthour)								
Generation.....	6.4	5.9	7.9	9.6	10.3	11.2	14.6	2.7%
Transmission.....	1.1	1.1	1.6	1.8	2.0	2.3	2.9	2.8%
Distribution.....	2.9	3.3	4.0	4.2	4.7	5.3	6.4	2.0%
<b>Electric power sector emissions<sup>1</sup></b>								
Sulfur dioxide (million short tons).....	2.19	1.10	1.11	0.93	0.95	0.93	0.88	-0.7%
Nitrogen oxide (million short tons).....	1.35	1.01	0.96	0.88	0.84	0.82	0.80	-0.7%
Mercury (short tons).....	23.46	4.90	4.72	3.97	3.77	3.59	3.31	-1.1%

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

<sup>2</sup>Includes plants that only produce electricity and that have a regulatory status.

<sup>3</sup>Includes electricity generation from fuel cells.

<sup>4</sup>Includes non-biogenic municipal waste. The U.S. Energy Information Administration estimates that in 2016 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).

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

<sup>6</sup>Includes 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).

<sup>7</sup>Includes 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.

<sup>8</sup>Includes refinery gas and still gas.

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

<sup>10</sup>Includes batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

<sup>11</sup>Includes 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 2015 are model results and may differ from official EIA data reports.

**Sources:** 2015 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*, October 2016, and supporting databases. 2015 emissions: U.S. Environmental Protection Agency, Clean Air Markets Database. 2015 electricity prices by service category: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. **Projections:** EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Net summer capacity <sup>1</sup>	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Electric power sector<sup>2</sup></b>								
<b>Power only<sup>3</sup></b>								
Coal <sup>4</sup> .....	273.6	261.7	199.8	183.0	171.6	166.5	156.5	-1.5%
Oil and natural gas steam <sup>4,5</sup> .....	93.0	95.7	61.0	51.8	46.3	41.3	36.7	-2.8%
Combined cycle.....	202.0	208.4	218.9	248.1	277.4	301.9	349.8	1.5%
Combustion turbine/diesel.....	136.5	138.7	131.6	135.7	141.5	149.6	171.2	0.6%
Nuclear power <sup>6</sup> .....	98.5	99.1	97.2	96.5	90.6	88.2	76.5	-0.8%
Pumped storage.....	22.6	22.6	22.6	22.6	22.6	22.6	22.6	0.0%
Fuel cells.....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2%
Renewable sources <sup>7</sup> .....	173.0	190.5	283.0	303.7	326.3	362.5	432.4	2.4%
Distributed generation (natural gas) <sup>8</sup> .....	0.0	0.0	0.5	0.9	1.9	4.0	9.5	--
<b>Total .....</b>	<b>999.2</b>	<b>1,016.8</b>	<b>1,014.5</b>	<b>1,042.4</b>	<b>1,078.4</b>	<b>1,136.7</b>	<b>1,255.4</b>	<b>0.6%</b>
<b>Combined heat and power<sup>9</sup></b>								
Coal.....	3.6	3.6	3.3	3.3	3.3	3.3	3.3	-0.3%
Oil and natural gas steam <sup>5</sup> .....	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.2%
Combined cycle.....	24.3	24.3	24.6	24.6	24.6	24.6	24.6	0.0%
Combustion turbine/diesel.....	3.1	3.1	3.1	3.1	3.1	3.1	3.1	0.0%
Renewable sources <sup>7</sup> .....	1.1	1.1	1.1	1.1	1.1	1.1	1.1	0.0%
<b>Total .....</b>	<b>32.6</b>	<b>32.7</b>	<b>32.7</b>	<b>32.7</b>	<b>32.7</b>	<b>32.7</b>	<b>32.7</b>	<b>0.0%</b>
<b>Cumulative planned additions<sup>10</sup></b>								
Coal.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Oil and natural gas steam <sup>5</sup> .....	--	--	0.0	0.0	0.0	0.0	0.0	--
Combined cycle.....	--	--	18.0	18.0	18.0	18.0	18.0	--
Combustion turbine/diesel.....	--	--	2.3	2.3	2.3	2.3	2.3	--
Nuclear power.....	--	--	4.4	4.4	4.4	4.4	4.4	--
Pumped 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 <sup>7</sup> .....	--	--	15.8	15.8	15.8	15.8	15.8	--
Distributed generation <sup>8</sup> .....	--	--	0.0	0.0	0.0	0.0	0.0	--
<b>Total .....</b>	<b>--</b>	<b>--</b>	<b>40.6</b>	<b>40.6</b>	<b>40.6</b>	<b>40.6</b>	<b>40.6</b>	<b>--</b>
<b>Cumulative unplanned additions<sup>10</sup></b>								
Coal.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Oil and natural gas steam <sup>5</sup> .....	--	--	0.0	0.0	0.0	0.0	0.0	--
Combined cycle.....	--	--	7.8	37.2	67.7	96.5	153.1	--
Combustion turbine/diesel.....	--	--	4.2	10.4	18.3	28.1	52.6	--
Nuclear power.....	--	--	0.0	0.0	0.0	0.0	0.0	--
Pumped 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 <sup>7</sup> .....	--	--	76.9	97.6	120.2	156.4	226.3	--
Distributed generation <sup>8</sup> .....	--	--	0.5	0.9	1.9	4.0	9.5	--
<b>Total .....</b>	<b>--</b>	<b>--</b>	<b>89.3</b>	<b>146.1</b>	<b>208.2</b>	<b>285.0</b>	<b>441.6</b>	<b>--</b>
<b>Cumulative electric power sector additions<sup>10</sup> ..</b>	<b>--</b>	<b>--</b>	<b>129.9</b>	<b>186.7</b>	<b>248.8</b>	<b>325.6</b>	<b>482.1</b>	<b>--</b>
<b>Cumulative retirements<sup>11</sup></b>								
Coal.....	--	--	59.1	74.7	86.0	91.2	100.5	--
Oil and natural gas steam <sup>5</sup> .....	--	--	38.0	48.3	53.9	58.9	64.0	--
Combined cycle.....	--	--	14.9	15.1	16.3	20.7	29.3	--
Combustion turbine/diesel.....	--	--	13.7	15.8	17.9	19.5	22.5	--
Nuclear power.....	--	--	8.3	9.8	16.4	20.0	31.7	--
Pumped 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 <sup>7</sup> .....	--	--	0.5	0.5	0.5	0.5	0.6	--
<b>Total .....</b>	<b>--</b>	<b>--</b>	<b>134.4</b>	<b>164.2</b>	<b>191.0</b>	<b>210.8</b>	<b>248.6</b>	<b>--</b>
<b>Total electric power sector capacity .....</b>	<b>1,031.8</b>	<b>1,049.5</b>	<b>1,047.2</b>	<b>1,075.1</b>	<b>1,111.1</b>	<b>1,169.3</b>	<b>1,288.0</b>	<b>0.6%</b>

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

Net summer capacity <sup>1</sup>	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>End-use generators<sup>12</sup></b>								
Coal .....	3.6	3.5	3.2	3.0	2.8	2.7	2.4	-1.1%
Petroleum .....	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-0.2%
Natural gas .....	16.6	17.0	20.7	24.3	28.6	33.3	44.1	2.8%
Other gaseous fuels <sup>13</sup> .....	2.4	2.4	3.0	3.0	3.0	3.0	3.0	0.7%
Renewable sources <sup>7</sup> .....	19.0	22.8	51.4	72.7	101.0	136.3	236.4	7.1%
Other <sup>14</sup> .....	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.0%
<b>Total .....</b>	<b>42.8</b>	<b>46.9</b>	<b>79.4</b>	<b>104.1</b>	<b>136.5</b>	<b>176.5</b>	<b>287.1</b>	<b>5.5%</b>
<b>Cumulative capacity additions<sup>10</sup> .....</b>	<b>--</b>	<b>--</b>	<b>34.4</b>	<b>59.9</b>	<b>92.7</b>	<b>132.9</b>	<b>243.9</b>	<b>--</b>

<sup>1</sup>Net 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.

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

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

<sup>4</sup>Total 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 2.2 gigawatts of planned conversions as well as additional model-projected conversions.

<sup>5</sup>Includes oil-, gas-, and dual-fired capacity.

<sup>6</sup>Nuclear capacity includes 4.7 gigawatts of uprates.

<sup>7</sup>Includes 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.

<sup>8</sup>Primarily peak load capacity fueled by natural gas.

<sup>9</sup>Includes 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).

<sup>10</sup>Cumulative additions after December 31, 2016.

<sup>11</sup>Cumulative retirements after December 31, 2016.

<sup>12</sup>Includes 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.

<sup>13</sup>Includes refinery gas and still gas.

<sup>14</sup>Includes 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 capacity and projected planned additions: U.S. Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report" (preliminary). 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Electricity trade	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Interregional electricity trade</b>								
Gross domestic sales								
Firm power.....	102	99	92	73	53	49	47	-2.1%
Economy.....	223	194	255	235	228	227	217	0.3%
<b>Total .....</b>	<b>326</b>	<b>292</b>	<b>347</b>	<b>308</b>	<b>281</b>	<b>275</b>	<b>264</b>	<b>-0.3%</b>
Gross domestic sales (million 2016 dollars)								
Firm power.....	6,672	6,425	5,963	4,757	3,428	3,169	3,091	-2.1%
Economy.....	7,525	5,963	11,843	12,720	12,617	12,306	13,495	2.4%
<b>Total .....</b>	<b>14,196</b>	<b>12,388</b>	<b>17,806</b>	<b>17,477</b>	<b>16,045</b>	<b>15,475</b>	<b>16,586</b>	<b>0.9%</b>
<b>International electricity trade</b>								
Imports from Canada and Mexico								
Firm power.....	19.6	28.5	27.9	25.9	22.6	19.5	18.5	-1.3%
Economy.....	56.0	41.2	43.7	37.6	36.0	35.9	36.0	-0.4%
<b>Total .....</b>	<b>75.6</b>	<b>69.7</b>	<b>71.6</b>	<b>63.5</b>	<b>58.6</b>	<b>55.4</b>	<b>54.5</b>	<b>-0.7%</b>
Exports to Canada and Mexico								
Firm power.....	2.7	1.8	1.8	0.9	0.0	0.0	0.0	--
Economy.....	6.5	10.8	12.7	13.0	13.2	13.2	13.2	0.6%
<b>Total .....</b>	<b>9.2</b>	<b>12.7</b>	<b>14.5</b>	<b>13.9</b>	<b>13.2</b>	<b>13.2</b>	<b>13.2</b>	<b>0.1%</b>

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2015 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: 2015 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. 2015 interregional economy electricity trade data are model results. 2015 Mexican electricity trade data: U.S. Energy Information Administration (EIA), *Electric Power Annual 2015*. 2015 Canadian international electricity trade data: National Energy Board, *Electricity Exports and Imports Statistics, 2015*. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Supply and disposition	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Crude oil</b>								
Domestic crude production <sup>1</sup> .....	9.42	8.74	10.38	10.54	10.23	10.34	9.86	0.4%
Alaska.....	0.48	0.48	0.54	0.60	0.53	0.47	0.30	-1.4%
Lower 48 states.....	8.93	8.27	9.84	9.94	9.71	9.87	9.57	0.4%
Net imports.....	6.90	7.47	6.87	6.75	6.93	7.06	7.87	0.2%
Gross imports.....	7.36	7.93	7.51	7.38	7.56	7.69	8.50	0.2%
Exports.....	0.47	0.46	0.63	0.63	0.63	0.64	0.63	0.9%
Other crude supply <sup>2</sup> .....	-0.12	0.09	0.07	0.00	0.00	0.00	0.00	--
<b>Total crude supply.....</b>	<b>16.19</b>	<b>16.30</b>	<b>17.32</b>	<b>17.29</b>	<b>17.16</b>	<b>17.40</b>	<b>17.73</b>	<b>0.2%</b>
Net product imports.....	-2.17	-2.64	-4.78	-5.29	-5.24	-5.17	-4.32	1.5%
Gross refined product imports <sup>3</sup> .....	0.89	0.83	1.10	1.07	1.20	1.33	1.37	1.5%
Unfinished oil imports.....	0.55	0.57	0.50	0.46	0.43	0.39	0.34	-1.5%
Blending component imports.....	0.60	0.62	0.52	0.46	0.38	0.32	0.27	-2.4%
Exports.....	4.21	4.66	6.89	7.29	7.25	7.21	6.30	0.9%
Refinery processing gain <sup>4</sup> .....	1.06	1.08	1.02	1.00	1.00	1.01	0.99	-0.3%
Product stock withdrawal.....	-0.18	0.00	0.00	0.00	0.00	0.00	0.00	--
Natural gas plant liquids.....	3.27	3.52	4.82	4.81	4.76	4.76	4.71	0.9%
Supply from renewable sources.....	1.01	1.05	1.06	1.03	1.01	1.01	1.13	0.2%
Ethanol.....	0.89	0.91	0.87	0.84	0.82	0.82	0.94	0.1%
Domestic production.....	0.94	0.96	0.96	0.94	0.92	0.92	0.88	-0.3%
Net imports.....	-0.05	-0.05	-0.08	-0.10	-0.10	-0.09	0.06	--
Stock withdrawal.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Biodiesel.....	0.11	0.14	0.09	0.05	0.05	0.05	0.05	--
Domestic production.....	0.08	0.10	0.05	0.01	0.01	0.01	0.01	-8.0%
Net imports.....	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.1%
Stock withdrawal.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Other biomass-derived liquids <sup>5</sup> .....	0.00	0.00	0.10	0.14	0.14	0.14	0.14	16.7%
Domestic production.....	0.00	0.00	0.10	0.14	0.14	0.14	0.14	16.7%
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 <sup>6</sup> .....	0.21	0.22	0.28	0.27	0.28	0.30	0.30	0.9%
<b>Total primary supply<sup>7</sup>.....</b>	<b>19.39</b>	<b>19.54</b>	<b>19.74</b>	<b>19.11</b>	<b>18.97</b>	<b>19.31</b>	<b>20.54</b>	<b>0.1%</b>
<b>Product supplied</b>								
<b>by fuel</b>								
Liquefied petroleum gases and other <sup>8</sup> .....	2.55	2.52	3.11	3.18	3.28	3.41	3.53	1.0%
Motor gasoline <sup>9</sup> .....	9.19	9.35	8.33	7.60	7.21	7.12	7.43	-0.7%
of which: E85 <sup>10</sup> .....	0.02	0.02	0.05	0.10	0.12	0.11	0.11	5.1%
Jet fuel <sup>11</sup> .....	1.55	1.59	1.79	1.93	2.07	2.23	2.54	1.4%
Distillate fuel oil <sup>12</sup> .....	4.00	3.82	4.13	3.95	3.87	3.92	4.20	0.3%
of which: Diesel.....	3.83	3.66	3.67	3.52	3.46	3.53	3.81	0.1%
Residual fuel oil.....	0.26	0.34	0.30	0.31	0.34	0.35	0.38	0.3%
Other <sup>13</sup> .....	2.01	1.97	2.11	2.16	2.22	2.31	2.48	0.7%
<b>by sector</b>								
Residential and commercial.....	0.90	0.91	0.89	0.86	0.84	0.81	0.79	-0.4%
Industrial <sup>14</sup> .....	4.53	4.54	5.57	5.71	5.89	6.12	6.48	1.1%
Transportation.....	14.01	14.17	13.47	12.69	12.38	12.49	13.39	-0.2%
Electric power <sup>15</sup> .....	0.13	0.10	0.06	0.05	0.05	0.04	0.03	-3.2%
Unspecified sector <sup>16</sup> .....	-0.27	-0.24	-0.23	-0.18	-0.15	-0.14	-0.13	-1.9%
<b>Total product supplied.....</b>	<b>19.55</b>	<b>19.59</b>	<b>19.77</b>	<b>19.13</b>	<b>19.00</b>	<b>19.34</b>	<b>20.57</b>	<b>0.1%</b>
Discrepancy <sup>17</sup> .....	-0.15	-0.05	-0.03	-0.02	-0.03	-0.03	-0.02	-1.9%

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

Supply and disposition	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
Domestic refinery distillation capacity <sup>18</sup> .....	18.1	18.4	19.0	19.0	19.0	19.0	19.0	0.1%
Capacity utilization rate (percent) <sup>19</sup> .....	91.0	90.1	92.8	92.5	91.7	92.8	94.4	0.1%
Net import share of product supplied (percent).....	24.3	24.7	10.4	7.3	8.6	9.5	17.7	-1.0%
Expenditures for imported crude oil and petroleum products (billion 2016 dollars).....	131	127	233	249	274	299	352	3.0%

<sup>1</sup>Includes lease condensate.  
<sup>2</sup>Strategic petroleum reserve stock additions plus unaccounted for crude oil and crude oil stock withdrawals.  
<sup>3</sup>Includes other hydrocarbons and alcohols.  
<sup>4</sup>The 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.  
<sup>5</sup>Includes pyrolysis oils, biomass-derived Fischer-Tropsch liquids, biobutanol, and renewable feedstocks used for the on-site production of diesel and gasoline.  
<sup>6</sup>Includes domestic sources of other blending components, other hydrocarbons, and ethers.  
<sup>7</sup>Total 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.  
<sup>8</sup>Includes ethane, natural gasoline, and refinery olefins.  
<sup>9</sup>Includes ethanol and ethers blended into gasoline.  
<sup>10</sup>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.  
<sup>11</sup>Includes only kerosene type.  
<sup>12</sup>Includes distillate fuel oil from petroleum and biomass feedstocks.  
<sup>13</sup>Includes 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.  
<sup>14</sup>Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems.  
<sup>15</sup>Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.  
<sup>16</sup>Represents consumption unattributed to the sectors above.  
<sup>17</sup>Balancing item. Includes unaccounted for supply, losses, and gains.  
<sup>18</sup>End-of-year operable capacity.  
<sup>19</sup>Rate 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 2015 are model results and may differ from official EIA data reports.  
**Sources:** 2015 product supplied based on: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. Other 2015 data: EIA, *Petroleum Supply Annual 2014*. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.  
**Projections:** EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.



**Table A12. Petroleum and other liquids prices**  
(2016 dollars per gallon, unless otherwise noted)

Sector and fuel	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Crude oil prices (2016 dollars per barrel)</b>								
Brent spot .....	53	43	86	95	102	109	117	3.0%
West Texas Intermediate spot .....	49	43	80	88	96	103	110	2.8%
Average imported refiners acquisition cost <sup>1</sup> .....	47	38	79	86	93	100	108	3.1%
Brent / West Texas Intermediate spread .....	4	1	6	7	7	7	6	7.0%
<b>Delivered sector product prices</b>								
<b>Residential</b>								
Propane .....	1.57	1.49	1.66	1.70	1.79	1.90	2.05	1.0%
Distillate fuel oil .....	2.70	2.12	3.31	3.48	3.67	3.85	4.04	1.9%
<b>Commercial</b>								
Distillate fuel oil .....	2.37	1.86	2.80	2.99	3.17	3.33	3.49	1.9%
Residual fuel oil .....	1.09	0.80	1.65	1.81	1.97	2.12	2.29	3.1%
Residual fuel oil (2016 dollars per barrel) .....	46	34	69	76	83	89	96	3.1%
<b>Industrial<sup>2</sup></b>								
Propane .....	1.14	1.05	1.22	1.27	1.36	1.48	1.63	1.3%
Distillate fuel oil .....	2.37	1.86	2.86	3.06	3.24	3.39	3.55	1.9%
Residual fuel oil .....	1.05	0.77	1.94	2.10	2.26	2.41	2.57	3.6%
Residual fuel oil (2016 dollars per barrel) .....	44	32	81	88	95	101	108	3.6%
<b>Transportation</b>								
Propane .....	1.67	1.58	1.75	1.79	1.89	2.00	2.15	0.9%
E85 <sup>3</sup> .....	2.75	2.46	2.84	2.45	2.44	2.73	2.96	0.6%
Ethanol wholesale price .....	2.25	2.22	2.83	2.61	2.51	2.42	2.31	0.1%
Motor gasoline <sup>4</sup> .....	2.55	2.21	2.92	3.02	3.15	3.30	3.42	1.3%
Jet fuel <sup>5</sup> .....	1.65	1.32	2.39	2.60	2.79	2.98	3.23	2.7%
Diesel fuel (distillate fuel oil) <sup>6</sup> .....	2.76	2.31	3.54	3.74	3.92	4.07	4.23	1.8%
Residual fuel oil .....	1.21	0.89	1.75	1.93	2.09	2.26	2.45	3.0%
Residual fuel oil (2016 dollars per barrel) .....	51	37	74	81	88	95	103	3.0%
<b>Electric power<sup>7</sup></b>								
Distillate fuel oil .....	2.10	1.64	2.68	2.85	3.02	3.20	3.38	2.1%
Residual fuel oil .....	1.52	1.21	2.31	2.49	2.65	2.77	2.83	2.5%
Residual fuel oil (2016 dollars per barrel) .....	64	51	97	105	111	116	119	2.5%
<b>Average prices, all sectors<sup>8</sup></b>								
Propane .....	1.36	1.28	1.46	1.49	1.58	1.69	1.83	1.0%
Motor gasoline <sup>4</sup> .....	2.55	2.21	2.92	3.02	3.15	3.30	3.42	1.3%
Jet fuel <sup>5</sup> .....	1.65	1.32	2.39	2.60	2.79	2.98	3.23	2.7%
Distillate fuel oil .....	2.67	2.20	3.36	3.56	3.74	3.89	4.05	1.8%
Residual fuel oil .....	1.29	0.93	1.79	1.96	2.12	2.28	2.45	2.9%
Residual fuel oil (2016 dollars per barrel) .....	54	39	75	82	89	96	103	2.9%
<b>Average</b> .....	<b>2.21</b>	<b>1.87</b>	<b>2.55</b>	<b>2.64</b>	<b>2.75</b>	<b>2.88</b>	<b>3.04</b>	<b>1.4%</b>

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

Sector and fuel	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Crude oil prices (nominal dollars per barrel)</b>								
Brent spot .....	52	43	104	128	152	179	236	5.1%
West Texas Intermediate spot .....	49	43	97	118	143	169	223	5.0%
Average imported refiners acquisition cost <sup>1</sup> .....	46	38	95	116	139	165	218	5.2%
<b>Delivered sector product prices</b>								
<b>Residential</b>								
Propane .....	1.55	1.49	2.00	2.29	2.67	3.12	4.16	3.1%
Distillate fuel oil .....	2.66	2.12	4.00	4.71	5.48	6.32	8.17	4.0%
<b>Commercial</b>								
Distillate fuel oil .....	2.34	1.86	3.39	4.04	4.74	5.46	7.06	4.0%
Residual fuel oil .....	1.08	0.80	1.99	2.45	2.94	3.48	4.63	5.3%
Residual fuel oil (nominal dollars per barrel) .....	45	34	84	103	124	146	194	5.3%
<b>Industrial<sup>2</sup></b>								
Propane .....	1.12	1.05	1.48	1.71	2.03	2.43	3.31	3.4%
Distillate fuel oil .....	2.34	1.86	3.46	4.13	4.84	5.57	7.19	4.1%
Residual fuel oil .....	1.04	0.77	2.35	2.84	3.38	3.95	5.21	5.8%
Residual fuel oil (nominal dollars per barrel) .....	43	32	99	119	142	166	219	5.8%
<b>Transportation</b>								
Propane .....	1.64	1.58	2.12	2.42	2.82	3.28	4.35	3.0%
E85 <sup>3</sup> .....	2.72	2.46	3.43	3.31	3.65	4.48	6.00	2.7%
Ethanol wholesale price .....	2.22	2.22	3.42	3.53	3.74	3.97	4.67	2.2%
Motor gasoline <sup>4</sup> .....	2.51	2.21	3.54	4.08	4.70	5.41	6.92	3.4%
Jet fuel <sup>5</sup> .....	1.63	1.32	2.89	3.51	4.16	4.89	6.53	4.8%
Diesel fuel (distillate fuel oil) <sup>6</sup> .....	2.72	2.31	4.28	5.06	5.86	6.68	8.55	3.9%
Residual fuel oil .....	1.19	0.89	2.12	2.60	3.13	3.70	4.95	5.2%
Residual fuel oil (nominal dollars per barrel) .....	50	37	89	109	131	155	208	5.2%
<b>Electric power<sup>7</sup></b>								
Distillate fuel oil .....	2.07	1.64	3.24	3.85	4.51	5.24	6.85	4.3%
Residual fuel oil .....	1.50	1.21	2.79	3.36	3.95	4.55	5.73	4.7%
Residual fuel oil (nominal dollars per barrel) .....	63	51	117	141	166	191	240	4.7%
<b>Average prices, all sectors<sup>8</sup></b>								
Propane .....	1.34	1.28	1.76	2.02	2.36	2.77	3.70	3.2%
Motor gasoline <sup>4</sup> .....	2.51	2.21	3.54	4.08	4.70	5.41	6.92	3.4%
Jet fuel <sup>5</sup> .....	1.63	1.32	2.89	3.51	4.16	4.89	6.53	4.8%
Distillate fuel oil .....	2.64	2.20	4.07	4.81	5.58	6.38	8.20	3.9%
Residual fuel oil .....	1.27	0.93	2.17	2.65	3.17	3.73	4.96	5.1%
Residual fuel oil (nominal dollars per barrel) .....	53	39	91	111	133	157	208	5.1%
<b>Average</b> .....	<b>2.18</b>	<b>1.87</b>	<b>3.08</b>	<b>3.56</b>	<b>4.10</b>	<b>4.72</b>	<b>6.15</b>	<b>3.6%</b>

<sup>1</sup>Weighted average price delivered to U.S. refiners.

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

<sup>3</sup>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.

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

<sup>5</sup>Includes only kerosene type.

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

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

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

Note: Data for 2015 are model results and may differ from official EIA data reports.

**Sources:** 2015 Brent and West Texas Intermediate crude oil spot prices: Thomson Reuters. 2015 average imported crude oil price: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. 2015 prices for motor gasoline, distillate fuel oil, and jet fuel are based on: EIA, *Petroleum Marketing Monthly*, October 2016. 2015 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." 2015 electric power prices based on: EIA, *Monthly Energy Review*, October 2016. 2015 E85 prices derived from monthly prices in the Clean Cities Alternative Fuel Price Report. 2015 wholesale ethanol prices derived from Bloomberg U.S. average rack price. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. **Projections:** EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Supply, disposition, and prices	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Supply</b>								
Dry gas production <sup>1</sup> .....	27.03	26.53	33.06	34.91	36.52	37.74	40.28	1.2%
Supplemental natural gas <sup>2</sup> .....	0.06	0.05	0.06	0.06	0.06	0.06	0.06	0.4%
Net imports .....	0.93	0.94	-4.70	-5.36	-5.75	-5.73	-5.56	--
Pipeline <sup>3</sup> .....	0.87	1.03	-1.06	-1.31	-1.37	-1.35	-1.18	--
Liquefied natural gas .....	0.06	-0.09	-3.65	-4.05	-4.38	-4.38	-4.38	12.1%
<b>Total supply</b> .....	<b>28.03</b>	<b>27.52</b>	<b>28.41</b>	<b>29.62</b>	<b>30.83</b>	<b>32.07</b>	<b>34.78</b>	<b>0.7%</b>
<b>Consumption by sector</b>								
Residential .....	4.61	4.42	4.65	4.61	4.57	4.54	4.55	0.1%
Commercial .....	3.20	3.13	3.14	3.17	3.26	3.37	3.67	0.5%
Industrial <sup>4</sup> .....	7.53	7.70	8.89	8.84	9.09	9.47	10.11	0.8%
Natural-gas-to-liquids heat and power <sup>5</sup> .....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Natural gas to liquids production <sup>6</sup> .....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Electric power <sup>7</sup> .....	9.63	10.11	8.63	9.69	10.42	11.04	12.50	0.6%
Transportation <sup>8</sup> .....	0.06	0.07	0.16	0.23	0.30	0.37	0.52	6.0%
Pipeline fuel .....	0.67	0.67	0.69	0.71	0.73	0.76	0.81	0.6%
Lease and plant fuel <sup>9</sup> .....	1.58	1.56	1.73	1.80	1.85	1.92	2.02	0.8%
Liquefaction for export <sup>10</sup> .....	0.00	0.02	0.37	0.41	0.44	0.44	0.44	10.3%
<b>Total consumption</b> .....	<b>27.29</b>	<b>27.68</b>	<b>28.25</b>	<b>29.45</b>	<b>30.67</b>	<b>31.91</b>	<b>34.62</b>	<b>0.7%</b>
<b>Discrepancy</b> <sup>11</sup> .....	<b>0.74</b>	<b>-0.16</b>	<b>0.17</b>	<b>0.17</b>	<b>0.17</b>	<b>0.17</b>	<b>0.16</b>	<b>--</b>
<b>Natural gas spot price at Henry Hub</b>								
(2016 dollars per million Btu) .....	2.66	2.50	4.51	5.00	5.09	5.07	5.83	2.5%
(nominal dollars per million Btu) .....	2.62	2.50	5.45	6.76	7.60	8.31	11.80	4.7%
<b>Delivered prices</b>								
<b>(2016 dollars per thousand cubic feet)</b>								
Residential .....	10.58	10.22	11.78	12.77	13.24	13.61	14.80	1.1%
Commercial .....	8.28	7.42	10.47	11.28	11.60	11.80	12.66	1.6%
Industrial <sup>4</sup> .....	3.85	3.61	5.66	6.09	6.13	6.12	6.79	1.9%
Electric power <sup>7</sup> .....	3.40	3.12	4.98	5.48	5.58	5.63	6.35	2.1%
Transportation <sup>12</sup> .....	16.95	16.97	16.97	16.37	15.82	15.58	16.13	-0.2%
<b>Average</b> <sup>13</sup> .....	<b>5.52</b>	<b>5.07</b>	<b>7.21</b>	<b>7.74</b>	<b>7.85</b>	<b>7.90</b>	<b>8.61</b>	<b>1.6%</b>
<b>(nominal dollars per thousand cubic feet)</b>								
Residential .....	10.43	10.22	14.26	17.25	19.77	22.31	29.95	3.2%
Commercial .....	8.17	7.42	12.67	15.24	17.32	19.35	25.62	3.7%
Industrial <sup>4</sup> .....	3.80	3.61	6.85	8.23	9.16	10.04	13.75	4.0%
Electric power <sup>7</sup> .....	3.35	3.12	6.02	7.40	8.33	9.23	12.84	4.2%
Transportation <sup>12</sup> .....	16.72	16.97	20.53	22.12	23.62	25.54	32.64	1.9%
<b>Average</b> <sup>13</sup> .....	<b>5.44</b>	<b>5.07</b>	<b>8.72</b>	<b>10.45</b>	<b>11.72</b>	<b>12.95</b>	<b>17.44</b>	<b>3.7%</b>

<sup>1</sup>Marketed production (wet) minus extraction losses.  
<sup>2</sup>Synthetic 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.  
<sup>3</sup>Natural gas imported from Canada and Mexico.  
<sup>4</sup>Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems. Excludes use for lease and plant fuel.  
<sup>5</sup>Includes any natural gas used in the process of converting natural gas to liquid fuel that is not actually converted.  
<sup>6</sup>Includes any natural gas converted into liquid fuel.  
<sup>7</sup>Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.  
<sup>8</sup>Natural gas used as fuel in motor vehicles, trains, and ships.  
<sup>9</sup>Represents natural gas used in well, field, and lease operations, and in natural gas processing plant machinery.  
<sup>10</sup>Fuel used in facilities that liquefy natural gas for export.  
<sup>11</sup>Balancing 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, 2015 values include net storage injections.  
<sup>12</sup>Natural gas used as fuel in motor vehicles, trains, and ships. Price includes estimated motor vehicle fuel taxes and estimated dispensing costs or charges.  
<sup>13</sup>Weighted average prices. Weights used are the sectoral consumption values excluding lease, plant, and pipeline fuel.  
-- = Not applicable.  
Note: Totals may not equal sum of components due to independent rounding. Data for 2015 are model results and may differ from official EIA data reports.  
Sources: 2015 supply values; lease, plant, and pipeline fuel consumption; and residential, commercial, and industrial delivered prices: U.S. Energy Information Administration (EIA), *Natural Gas Monthly*, December 2015). Other 2015 consumption based on: EIA, *Monthly Energy Review*, October 2016. 2015 natural gas spot price at Henry Hub: Thomson Reuters. 2015 electric power prices: EIA, *Electric Power Monthly*, July 2016, Table 4.13.B, and EIA, *State Energy Data Report 2014*. 2015 transportation sector delivered prices are model results. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

**Table A14. Oil and gas supply**

Production and supply	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Crude oil</b>								
<b>Lower 48 average wellhead price<sup>1</sup></b> <b>(2016 dollars per barrel).....</b>	<b>45</b>	<b>43</b>	<b>83</b>	<b>90</b>	<b>98</b>	<b>105</b>	<b>113</b>	<b>2.9%</b>
<b>Production (million barrels per day)<sup>2</sup></b>								
United States total .....	9.42	8.74	10.38	10.54	10.23	10.34	9.86	0.4%
Lower 48 onshore .....	7.33	6.54	8.06	8.38	8.19	8.37	8.14	0.6%
Tight oil <sup>3</sup> .....	4.87	4.60	5.91	6.18	6.02	6.30	6.23	0.9%
Carbon dioxide enhanced oil recovery.....	0.31	0.30	0.42	0.49	0.49	0.43	0.34	0.4%
Other.....	2.15	1.65	1.73	1.72	1.68	1.65	1.56	-0.2%
Lower 48 offshore .....	1.61	1.72	1.78	1.56	1.52	1.49	1.43	-0.6%
State .....	0.07	0.07	0.04	0.04	0.03	0.03	0.02	-3.2%
Federal .....	1.54	1.65	1.73	1.52	1.48	1.46	1.40	-0.5%
Alaska.....	0.48	0.48	0.54	0.60	0.53	0.47	0.30	-1.4%
Onshore.....	0.38	0.40	0.38	0.34	0.27	0.25	0.17	-2.5%
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	1.8%
<b>Natural gas plant liquids production</b> <b>(million barrels per day)</b>								
United States total .....	3.27	3.53	4.82	4.82	4.76	4.76	4.71	0.9%
Lower 48 onshore .....	2.88	3.09	4.33	4.35	4.25	4.24	4.23	0.9%
Lower 48 offshore .....	0.36	0.41	0.44	0.41	0.45	0.47	0.45	0.3%
Alaska.....	0.03	0.03	0.05	0.06	0.05	0.05	0.03	-0.3%
<b>Natural gas</b>								
<b>Natural gas spot price at Henry Hub</b> <b>(2016 dollars per million Btu).....</b>	<b>2.66</b>	<b>2.50</b>	<b>4.51</b>	<b>5.00</b>	<b>5.09</b>	<b>5.07</b>	<b>5.83</b>	<b>2.5%</b>
<b>Dry production (trillion cubic feet)<sup>4</sup></b>								
United States total .....	27.03	26.53	33.06	34.91	36.52	37.74	40.28	1.2%
Lower 48 onshore .....	25.39	24.48	31.32	33.23	34.67	35.79	38.43	1.3%
Tight gas.....	4.65	4.67	4.75	4.88	5.51	5.78	6.45	1.0%
Shale gas and tight oil plays <sup>3</sup> .....	13.53	14.08	20.82	22.89	24.12	25.28	27.45	2.0%
Coalbed methane .....	1.01	1.14	1.05	1.03	0.95	0.87	0.79	-1.1%
Other.....	6.21	4.59	4.71	4.43	4.09	3.87	3.74	-0.6%
Lower 48 offshore .....	1.31	1.75	1.42	1.36	1.55	1.64	1.56	-0.3%
State .....	0.10	0.14	0.04	0.03	0.03	0.02	0.02	-6.2%
Federal .....	1.21	1.62	1.38	1.33	1.52	1.62	1.54	-0.1%
Alaska.....	0.33	0.30	0.31	0.32	0.31	0.31	0.29	-0.1%
<b>Supplemental gas supplies (trillion cubic feet)<sup>5</sup></b>	<b>0.06</b>	<b>0.05</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>	<b>0.4%</b>
<b>Total lower 48 wells drilled (thousands).....</b>	<b>30.4</b>	<b>30.1</b>	<b>33.8</b>	<b>36.1</b>	<b>37.3</b>	<b>38.5</b>	<b>39.9</b>	<b>0.8%</b>

<sup>1</sup>Represents lower 48 onshore and offshore supplies.

<sup>2</sup>Includes lease condensate.

<sup>3</sup>Tight 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.

<sup>4</sup>Marketed production (wet) minus extraction losses.

<sup>5</sup>Synthetic 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 crude oil lower 48 average wellhead price: U.S. Energy Information Administration (EIA), *Petroleum Marketing Monthly*, October 2016. 2015 lower 48 onshore, lower 48 offshore, and Alaska crude oil production: EIA, *Petroleum Supply Annual 2015*. 2015 natural gas spot price at Henry Hub: Thomson Reuters. 2015 Alaska and total natural gas production, and supplemental gas supplies: EIA, *Natural Gas Monthly*, December 2015). Other 2015 values: EIA, Office of Energy Analysis. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Supply, disposition, and prices	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Production<sup>1</sup></b>								
Appalachia.....	218	184	157	132	136	130	120	-1.3%
Interior.....	164	151	181	154	161	159	165	0.3%
West.....	497	405	416	380	340	329	298	-0.9%
East of the Mississippi.....	327	293	295	252	266	264	267	-0.3%
West of the Mississippi.....	552	447	459	414	371	355	316	-1.0%
<b>Total.....</b>	<b>879</b>	<b>740</b>	<b>754</b>	<b>665</b>	<b>638</b>	<b>619</b>	<b>583</b>	<b>-0.7%</b>
<b>Waste coal supplied<sup>2</sup>.....</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>8</b>	<b>7</b>	<b>8</b>	<b>8</b>	<b>-0.5%</b>
<b>Net imports</b>								
Imports <sup>3</sup> .....	11	11	4	2	1	1	1	-7.0%
Exports.....	75	54	63	68	74	81	85	1.3%
<b>Total.....</b>	<b>-64</b>	<b>-44</b>	<b>-59</b>	<b>-66</b>	<b>-73</b>	<b>-80</b>	<b>-84</b>	<b>2.0%</b>
<b>Total supply<sup>4</sup>.....</b>	<b>825</b>	<b>707</b>	<b>704</b>	<b>608</b>	<b>572</b>	<b>547</b>	<b>507</b>	<b>-1.0%</b>
<b>Consumption by sector</b>								
Commercial and institutional.....	1	2	2	2	2	2	2	0.7%
Coke plants.....	20	18	15	14	12	10	7	-2.9%
Other industrial <sup>5</sup> .....	38	37	39	36	35	34	34	-0.2%
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 <sup>6</sup> .....	750	660	649	556	523	501	464	-1.0%
<b>Total.....</b>	<b>809</b>	<b>716</b>	<b>704</b>	<b>608</b>	<b>572</b>	<b>547</b>	<b>507</b>	<b>-1.0%</b>
<b>Discrepancy and stock change<sup>7</sup>.....</b>	<b>16</b>	<b>-9</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>--</b>
<b>Average minemouth price<sup>8</sup></b>								
(2016 dollars per short ton).....	34.2	33.9	34.7	34.3	36.5	37.9	40.1	0.5%
(2016 dollars per million Btu).....	1.72	1.69	1.75	1.74	1.82	1.87	1.96	0.4%
<b>Delivered prices<sup>9</sup></b>								
<b>(2016 dollars per short ton)</b>								
Commercial and institutional.....	86.0	84.3	86.1	86.2	86.0	86.3	88.1	0.1%
Coke plants.....	155.8	161.8	188.7	203.6	211.0	212.3	204.6	0.7%
Other industrial <sup>5</sup> .....	70.4	69.1	72.2	72.0	71.7	72.2	74.3	0.2%
Coal to liquids.....	--	--	--	--	--	--	--	--
Electric power <sup>6</sup>								
(2016 dollars per short ton).....	42.9	41.0	44.0	42.8	44.0	45.2	45.9	0.3%
(2016 dollars per million Btu).....	2.28	2.14	2.33	2.30	2.32	2.37	2.39	0.3%
<b>Average.....</b>	<b>47.0</b>	<b>45.6</b>	<b>48.7</b>	<b>48.3</b>	<b>49.2</b>	<b>50.0</b>	<b>50.1</b>	<b>0.3%</b>
Exports <sup>10</sup> .....	88.1	85.4	83.6	81.6	85.1	84.2	89.6	0.1%

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

Supply, disposition, and prices	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Average minemouth price<sup>8</sup></b>								
(nominal dollars per short ton) .....	33.7	33.9	42.0	46.3	54.5	62.1	81.1	2.6%
(nominal dollars per million Btu).....	1.70	1.69	2.11	2.34	2.71	3.07	3.97	2.5%
<b>Delivered prices<sup>9</sup></b>								
<b>(nominal dollars per short ton)</b>								
Commercial and institutional.....	84.8	84.3	104.2	116.4	128.3	141.5	178.4	2.2%
Coke plants.....	153.6	161.8	228.4	275.1	315.0	348.1	414.2	2.8%
Other industrial <sup>5</sup> .....	69.4	69.1	87.3	97.3	107.0	118.4	150.4	2.3%
Coal to liquids.....	--	--	--	--	--	--	--	--
Electric power <sup>6</sup>								
(nominal dollars per short ton) .....	42.3	41.0	53.2	57.8	65.7	74.2	92.9	2.4%
(nominal dollars per million Btu).....	2.24	2.14	2.82	3.10	3.47	3.89	4.83	2.4%
<b>Average.....</b>	<b>46.4</b>	<b>45.6</b>	<b>58.9</b>	<b>65.3</b>	<b>73.5</b>	<b>82.0</b>	<b>101.4</b>	<b>2.4%</b>
Exports <sup>10</sup> .....	86.9	85.4	101.2	110.2	127.0	138.1	181.4	2.2%

<sup>1</sup>Includes anthracite, bituminous coal, subbituminous coal, and lignite.  
<sup>2</sup>Includes 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.  
<sup>3</sup>Excludes imports to Puerto Rico and the U.S. Virgin Islands.  
<sup>4</sup>Production plus waste coal supplied plus net imports.  
<sup>5</sup>Includes 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.  
<sup>6</sup>Includes all electricity-only and combined heat and power plants that have a regulatory status.  
<sup>7</sup>Balancing item: the sum of production, net imports, and waste coal supplied minus total consumption.  
<sup>8</sup>Includes 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.  
<sup>9</sup>Prices weighted by consumption; weighted average excludes commercial and institutional prices, and export free-alongside-ship prices.  
<sup>10</sup>Free-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 2015 are model results and may differ from official EIA data reports.  
**Sources:** 2015 data based on: U.S. Energy Information Administration (EIA), *Annual Coal Report 2013*; EIA, *Quarterly Coal Report, October-December 2015*; and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. 2016: EIA, *Short-Term Energy Outlook, October 2016* and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. **Projections:** EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Net summer capacity and generation	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Electric power sector<sup>1</sup></b>								
<b>Net summer capacity</b>								
Conventional hydroelectric power.....	79.0	79.3	79.8	80.1	80.4	80.5	80.9	0.1%
Geothermal <sup>2</sup> .....	2.5	2.5	4.0	5.3	6.4	7.0	7.9	3.5%
Municipal waste <sup>3</sup> .....	3.7	3.8	3.8	3.8	3.8	3.8	3.8	0.0%
Wood and other biomass <sup>4</sup> .....	3.6	3.6	3.7	3.7	3.8	4.0	4.6	0.7%
Solar thermal.....	1.8	1.8	2.0	2.0	2.0	2.0	2.0	0.3%
Solar photovoltaic <sup>5</sup> .....	11.6	19.4	38.5	57.1	76.1	104.7	148.0	6.2%
Wind.....	71.9	81.3	152.3	152.8	155.1	161.6	186.3	2.5%
Offshore wind.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
<b>Total electric power sector capacity.....</b>	<b>174.1</b>	<b>191.6</b>	<b>284.1</b>	<b>304.8</b>	<b>327.4</b>	<b>363.6</b>	<b>433.5</b>	<b>2.4%</b>
<b>Generation (billion kilowatthours)</b>								
Conventional hydroelectric power.....	247.6	262.5	310.6	312.4	313.6	314.7	317.0	0.6%
Geothermal <sup>2</sup> .....	15.9	16.8	28.7	39.3	48.4	53.3	61.1	3.9%
Biogenic municipal waste <sup>6</sup> .....	18.1	19.8	21.2	21.0	20.8	21.7	22.5	0.4%
Wood and other biomass.....	14.5	5.2	10.0	14.2	14.3	16.1	21.0	4.2%
Dedicated plants.....	13.8	4.6	9.6	13.7	13.8	15.6	20.4	4.5%
Cofiring.....	0.7	0.6	0.4	0.5	0.5	0.5	0.5	-0.4%
Solar thermal.....	3.2	3.2	3.6	3.6	3.5	3.4	3.4	0.1%
Solar photovoltaic <sup>5</sup> .....	21.2	30.4	75.6	111.1	151.8	208.9	292.0	6.9%
Wind.....	190.6	220.8	488.0	490.2	497.5	520.6	604.6	3.0%
Offshore wind.....	0.0	0.0	0.1	0.1	0.1	0.1	0.1	3.7%
<b>Total electric power sector generation.....</b>	<b>511.1</b>	<b>558.8</b>	<b>937.9</b>	<b>991.9</b>	<b>1,050.0</b>	<b>1,138.8</b>	<b>1,321.8</b>	<b>2.6%</b>
<b>End-use sectors<sup>7</sup></b>								
<b>Net summer capacity</b>								
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 <sup>8</sup> .....	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0%
Biomass.....	4.4	4.4	4.3	3.9	3.8	3.7	3.7	-0.5%
Solar photovoltaic <sup>5</sup> .....	11.6	14.4	43.1	64.5	92.5	127.3	225.7	8.4%
Wind.....	2.1	3.1	3.2	3.4	3.9	4.5	6.2	2.0%
<b>Total end-use sector capacity.....</b>	<b>19.0</b>	<b>22.8</b>	<b>51.4</b>	<b>72.7</b>	<b>101.0</b>	<b>136.3</b>	<b>236.4</b>	<b>7.1%</b>
<b>Generation (billion kilowatthours)</b>								
Conventional hydroelectric power.....	1.3	1.3	1.3	1.3	1.3	1.3	1.3	0.0%
Geothermal.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--
Municipal waste <sup>8</sup> .....	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.0%
Biomass.....	24.5	24.1	22.3	20.6	19.5	19.1	19.1	-0.7%
Solar photovoltaic <sup>5</sup> .....	16.1	20.0	60.9	92.1	133.4	185.2	333.3	8.6%
Wind.....	2.7	4.0	4.1	4.4	5.0	5.8	8.0	2.1%
<b>Total end-use sector generation.....</b>	<b>48.7</b>	<b>53.4</b>	<b>92.6</b>	<b>122.5</b>	<b>163.3</b>	<b>215.4</b>	<b>365.7</b>	<b>5.8%</b>

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

Net summer capacity and generation	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Total, all sectors</b>								
<b>Net summer capacity</b>								
Conventional hydroelectric power.....	79.2	79.6	80.1	80.4	80.6	80.8	81.2	0.1%
Geothermal.....	2.5	2.5	4.0	5.3	6.4	7.0	7.9	3.5%
Municipal waste.....	4.3	4.4	4.4	4.4	4.4	4.4	4.4	0.0%
Wood and other biomass <sup>4</sup> .....	8.0	7.9	8.0	7.7	7.5	7.7	8.3	0.1%
Solar <sup>5</sup> .....	25.0	35.6	83.6	123.6	170.5	234.0	375.7	7.2%
Wind.....	74.0	84.4	155.5	156.3	159.0	166.1	192.5	2.5%
<b>Total capacity, all sectors.....</b>	<b>193.1</b>	<b>214.4</b>	<b>335.4</b>	<b>377.5</b>	<b>428.4</b>	<b>499.9</b>	<b>669.9</b>	<b>3.4%</b>
<b>Generation (billion kilowatthours)</b>								
Conventional hydroelectric power.....	248.9	263.9	311.9	313.7	315.0	316.1	318.3	0.6%
Geothermal.....	15.9	16.8	28.7	39.3	48.4	53.3	61.1	3.9%
Municipal waste.....	22.1	23.8	25.2	25.1	24.8	25.7	26.6	0.3%
Wood and other biomass.....	39.0	29.3	32.4	34.7	33.8	35.2	40.0	0.9%
Solar <sup>5</sup> .....	40.5	53.7	140.1	206.8	288.7	397.4	628.7	7.5%
Wind.....	193.3	224.9	492.2	494.8	502.6	526.5	612.8	3.0%
<b>Total generation, all sectors.....</b>	<b>559.8</b>	<b>612.3</b>	<b>1,030.5</b>	<b>1,114.4</b>	<b>1,213.3</b>	<b>1,354.2</b>	<b>1,687.5</b>	<b>3.0%</b>

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

<sup>2</sup>Includes 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.

<sup>3</sup>Includes 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.

<sup>4</sup>Facilities co-firing biomass and coal are classified as coal.

<sup>5</sup>Does not include off-grid photovoltaics.

<sup>6</sup>Includes 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 2016 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).

<sup>7</sup>Includes 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.

<sup>8</sup>Includes 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 capacity: U.S. Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report" (preliminary). 2015 generation: EIA, *Monthly Energy Review*, October 2016. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.



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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Marketed renewable energy<sup>1</sup></b>								
<b>Residential (wood)</b> .....	<b>0.44</b>	<b>0.37</b>	<b>0.40</b>	<b>0.37</b>	<b>0.35</b>	<b>0.33</b>	<b>0.30</b>	<b>-0.6%</b>
<b>Commercial (biomass)</b> .....	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.0%</b>
<b>Industrial<sup>2</sup></b> .....	<b>2.33</b>	<b>2.35</b>	<b>2.46</b>	<b>2.47</b>	<b>2.47</b>	<b>2.54</b>	<b>2.64</b>	<b>0.3%</b>
Conventional hydroelectric power.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
Municipal waste <sup>3</sup> .....	0.19	0.19	0.24	0.25	0.26	0.27	0.29	1.3%
Biomass.....	1.29	1.26	1.36	1.36	1.38	1.43	1.55	0.6%
Biofuels heat and coproducts.....	0.85	0.90	0.86	0.85	0.84	0.84	0.80	-0.3%
<b>Transportation</b> .....	<b>1.38</b>	<b>1.46</b>	<b>1.52</b>	<b>1.47</b>	<b>1.46</b>	<b>1.46</b>	<b>1.61</b>	<b>0.3%</b>
Ethanol used in E85 <sup>4</sup> .....	0.01	0.02	0.04	0.09	0.12	0.10	0.11	5.1%
Ethanol used in gasoline blending.....	1.14	1.16	1.08	0.99	0.95	0.96	1.11	-0.1%
Biodiesel used in distillate blending.....	0.22	0.28	0.18	0.09	0.09	0.09	0.10	-3.0%
Biobutanol.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--
Liquids from biomass.....	0.00	0.00	0.01	0.01	0.01	0.01	0.01	5.7%
Renewable diesel and gasoline <sup>5</sup> .....	0.01	0.00	0.20	0.29	0.29	0.29	0.29	--
<b>Electric power<sup>6</sup></b> .....	<b>5.01</b>	<b>5.44</b>	<b>9.08</b>	<b>9.61</b>	<b>10.16</b>	<b>11.02</b>	<b>12.78</b>	<b>2.5%</b>
Conventional hydroelectric power.....	2.35	2.50	2.95	2.97	2.98	2.99	3.01	0.6%
Geothermal.....	0.15	0.16	0.28	0.38	0.46	0.51	0.59	3.8%
Biogenic municipal waste <sup>7</sup> .....	0.25	0.26	0.28	0.28	0.28	0.29	0.31	0.5%
Biomass.....	0.21	0.10	0.17	0.23	0.23	0.26	0.32	3.6%
Dedicated plants.....	0.19	0.06	0.13	0.18	0.19	0.21	0.28	4.5%
Cofiring.....	0.02	0.03	0.04	0.05	0.05	0.05	0.05	1.1%
Solar thermal.....	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.1%
Solar photovoltaic.....	0.20	0.29	0.72	1.05	1.44	1.98	2.76	6.9%
Wind.....	1.81	2.10	4.64	4.66	4.73	4.95	5.75	3.0%
<b>Total marketed renewable energy</b> .....	<b>9.29</b>	<b>9.75</b>	<b>13.58</b>	<b>14.05</b>	<b>14.57</b>	<b>15.48</b>	<b>17.46</b>	<b>1.7%</b>
<b>Sources of ethanol</b>								
from corn and other starch.....	1.22	1.24	1.23	1.21	1.19	1.18	1.14	-0.3%
from cellulose.....	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.4%
Net imports.....	-0.06	-0.07	-0.11	-0.13	-0.13	-0.12	0.07	--
<b>Total</b> .....	<b>1.15</b>	<b>1.18</b>	<b>1.13</b>	<b>1.08</b>	<b>1.06</b>	<b>1.06</b>	<b>1.22</b>	<b>0.1%</b>

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Nonmarketed renewable energy<sup>8</sup></b>								
<b>Selected consumption</b>								
<b>Residential .....</b>	<b>0.12</b>	<b>0.16</b>	<b>0.47</b>	<b>0.71</b>	<b>1.02</b>	<b>1.41</b>	<b>2.60</b>	<b>8.6%</b>
Solar hot water heating .....	0.01	0.01	0.02	0.02	0.02	0.02	0.03	2.8%
Geothermal heat pumps .....	0.01	0.01	0.02	0.02	0.02	0.02	0.03	2.7%
Solar photovoltaic .....	0.08	0.11	0.41	0.64	0.94	1.32	2.50	9.7%
Wind .....	0.02	0.03	0.03	0.03	0.04	0.04	0.04	1.0%
<b>Commercial .....</b>	<b>0.15</b>	<b>0.16</b>	<b>0.26</b>	<b>0.32</b>	<b>0.42</b>	<b>0.53</b>	<b>0.78</b>	<b>4.7%</b>
Solar thermal .....	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.4%
Solar photovoltaic .....	0.08	0.08	0.17	0.24	0.33	0.44	0.67	6.3%
Wind .....	0.01	0.01	0.01	0.01	0.01	0.02	0.03	4.9%

<sup>1</sup>Includes 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 fossil fuel equivalent of 9,510 Btu per kilowatt-hour.

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

<sup>3</sup>Includes 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.

<sup>4</sup>Excludes 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.

<sup>5</sup>Renewable feedstocks for the on-site production of diesel and gasoline.

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

<sup>7</sup>Includes 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 2016 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).

<sup>8</sup>Includes 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 ethanol: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. 2015 electric power sector: EIA, Form EIA-860, "Annual Electric Generator Report" (preliminary). Other 2015 values: EIA, Office of Energy Analysis. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Sector and source	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Residential</b>								
Petroleum .....	68	59	57	53	49	46	42	-1.0%
Natural gas .....	252	242	255	252	250	249	249	0.1%
Electricity <sup>1</sup> .....	721	675	589	546	543	539	523	-0.7%
<b>Total residential</b> .....	<b>1,041</b>	<b>977</b>	<b>901</b>	<b>852</b>	<b>843</b>	<b>834</b>	<b>814</b>	<b>-0.5%</b>
<b>Commercial</b>								
Petroleum .....	40	52	51	51	51	51	52	0.0%
Natural gas .....	175	171	172	173	179	185	201	0.5%
Coal .....	3	3	4	4	4	4	4	0.7%
Electricity <sup>1</sup> .....	699	652	577	534	532	533	558	-0.5%
<b>Total commercial</b> .....	<b>917</b>	<b>878</b>	<b>804</b>	<b>763</b>	<b>766</b>	<b>773</b>	<b>814</b>	<b>-0.2%</b>
<b>Industrial<sup>2</sup></b>								
Petroleum .....	342	376	414	417	420	428	444	0.5%
Natural gas <sup>3</sup> .....	476	484	565	568	586	610	651	0.9%
Coal .....	127	122	116	109	100	94	87	-1.0%
Electricity <sup>1</sup> .....	494	453	474	431	426	423	425	-0.2%
<b>Total industrial</b> .....	<b>1,438</b>	<b>1,436</b>	<b>1,570</b>	<b>1,525</b>	<b>1,532</b>	<b>1,555</b>	<b>1,607</b>	<b>0.3%</b>
<b>Transportation</b>								
Petroleum <sup>4</sup> .....	1,820	1,821	1,729	1,634	1,599	1,619	1,735	-0.1%
Natural gas <sup>5</sup> .....	39	40	46	52	56	61	72	1.7%
Electricity <sup>1</sup> .....	5	5	18	25	31	36	41	6.3%
<b>Total transportation</b> .....	<b>1,864</b>	<b>1,866</b>	<b>1,794</b>	<b>1,711</b>	<b>1,687</b>	<b>1,717</b>	<b>1,849</b>	<b>0.0%</b>
<b>Electric power<sup>6</sup></b>								
Petroleum .....	24	17	10	8	7	7	5	-3.3%
Natural gas .....	530	555	474	532	572	606	685	0.6%
Coal .....	1,353	1,202	1,164	986	941	906	845	-1.0%
Other <sup>7</sup> .....	12	12	12	12	12	12	12	0.0%
<b>Total electric power</b> .....	<b>1,919</b>	<b>1,785</b>	<b>1,659</b>	<b>1,537</b>	<b>1,532</b>	<b>1,531</b>	<b>1,547</b>	<b>-0.4%</b>
<b>Total by fuel</b>								
Petroleum <sup>4</sup> .....	2,294	2,325	2,261	2,163	2,127	2,151	2,278	-0.1%
Natural gas .....	1,471	1,493	1,512	1,577	1,644	1,711	1,858	0.6%
Coal .....	1,483	1,327	1,284	1,099	1,045	1,005	936	-1.0%
Other <sup>7</sup> .....	12	12	12	12	12	12	12	0.0%
<b>Total</b> .....	<b>5,259</b>	<b>5,157</b>	<b>5,069</b>	<b>4,851</b>	<b>4,827</b>	<b>4,878</b>	<b>5,084</b>	<b>0.0%</b>
<b>Carbon dioxide emissions</b>								
<b>(metric tons per person)</b> .....	<b>16.3</b>	<b>15.9</b>	<b>14.6</b>	<b>13.5</b>	<b>13.0</b>	<b>12.8</b>	<b>12.7</b>	<b>-0.6%</b>

<sup>1</sup>Emissions from the electric power sector are distributed to the end-use sectors.

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

<sup>3</sup>Includes lease and plant fuel.

<sup>4</sup>This 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.

<sup>5</sup>Includes pipeline fuel natural gas and natural gas used as fuel in motor vehicles, trains, and ships.

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

<sup>7</sup>Includes 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 emissions and emission factors: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Sector and end use	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Residential</b>								
Space heating.....	266	243	250	239	232	226	215	-0.4%
Space cooling.....	121	120	97	91	92	91	88	-0.9%
Water heating.....	139	135	130	126	123	120	122	-0.3%
Refrigeration.....	54	49	41	38	38	38	40	-0.6%
Cooking.....	29	28	28	28	28	29	30	0.2%
Clothes dryers.....	34	32	31	29	30	31	32	0.0%
Freezers.....	11	10	9	7	7	7	7	-1.2%
Lighting.....	68	62	36	30	28	27	24	-2.7%
Clothes washers <sup>1</sup> .....	4	4	2	2	2	2	2	-2.0%
Dishwashers <sup>1</sup> .....	14	13	13	13	13	13	14	0.2%
Televisions and related equipment <sup>2</sup> .....	43	40	31	30	32	34	34	-0.5%
Computers and related equipment <sup>3</sup> .....	17	15	10	8	7	6	4	-4.2%
Furnace fans and boiler circulation pumps.....	17	15	15	13	12	11	10	-1.2%
Other uses <sup>4</sup> .....	224	210	208	198	200	200	192	-0.3%
Discrepancy <sup>5</sup> .....	0	0	0	0	0	0	0	-0.5%
<b>Total residential.....</b>	<b>1,041</b>	<b>977</b>	<b>901</b>	<b>852</b>	<b>843</b>	<b>834</b>	<b>814</b>	<b>-0.5%</b>
<b>Commercial</b>								
Space heating <sup>6</sup> .....	123	121	115	109	105	101	93	-0.8%
Space cooling <sup>6</sup> .....	83	79	63	57	55	53	51	-1.3%
Water heating <sup>6</sup> .....	19	19	18	18	18	18	18	0.0%
Ventilation.....	79	73	61	50	45	41	36	-2.1%
Cooking.....	29	28	28	27	28	29	30	0.2%
Lighting.....	79	72	51	42	36	32	26	-2.9%
Refrigeration.....	96	90	79	70	66	64	64	-1.0%
Office equipment (PC).....	55	50	37	33	32	31	25	-2.0%
Office equipment (non-PC).....	34	32	32	33	35	36	41	0.7%
Other uses <sup>7</sup> .....	322	315	322	325	346	368	430	0.9%
<b>Total commercial.....</b>	<b>917</b>	<b>878</b>	<b>804</b>	<b>763</b>	<b>766</b>	<b>773</b>	<b>814</b>	<b>-0.2%</b>
<b>Industrial<sup>8</sup></b>								
Manufacturing								
Refining.....	255	249	246	238	237	242	240	-0.1%
Food products.....	93	92	103	106	113	121	138	1.2%
Paper products.....	68	64	55	47	42	39	35	-1.8%
Bulk chemicals.....	252	255	334	330	331	335	333	0.8%
Glass.....	15	15	16	15	14	14	14	-0.2%
Cement and lime.....	25	26	32	32	32	35	41	1.3%
Iron and steel.....	114	107	97	84	75	69	61	-1.6%
Aluminum.....	39	36	35	31	30	29	27	-0.9%
Fabricated metal products.....	32	30	31	29	30	30	31	0.1%
Machinery.....	17	16	19	19	20	22	25	1.4%
Computers and electronics.....	18	17	18	18	18	19	21	0.6%
Transportation equipment.....	35	34	35	33	34	37	42	0.6%
Electrical equipment.....	9	9	10	10	11	11	13	1.2%
Wood products.....	14	13	16	15	16	17	18	0.9%
Plastics.....	33	31	33	33	34	36	42	0.9%
Balance of manufacturing.....	123	119	117	111	110	109	112	-0.2%
<b>Total manufacturing.....</b>	<b>1,141</b>	<b>1,114</b>	<b>1,197</b>	<b>1,149</b>	<b>1,149</b>	<b>1,164</b>	<b>1,195</b>	<b>0.2%</b>
Nonmanufacturing								
Agriculture.....	87	82	86	85	85	86	88	0.2%
Construction.....	69	68	77	76	79	82	91	0.9%
Mining.....	112	99	107	103	102	103	107	0.2%
<b>Total nonmanufacturing.....</b>	<b>268</b>	<b>250</b>	<b>270</b>	<b>264</b>	<b>267</b>	<b>271</b>	<b>286</b>	<b>0.4%</b>
Discrepancy <sup>5</sup> .....	28	72	103	112	116	119	126	1.6%
<b>Total industrial.....</b>	<b>1,438</b>	<b>1,436</b>	<b>1,570</b>	<b>1,525</b>	<b>1,532</b>	<b>1,555</b>	<b>1,607</b>	<b>0.3%</b>

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

Sector and end use	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Transportation</b>								
Light-duty vehicles.....	1,063	1,061	940	852	806	793	814	-0.8%
Commercial light trucks <sup>9</sup> .....	59	59	57	55	55	57	65	0.2%
Bus transportation.....	18	17	18	18	18	18	18	0.1%
Freight trucks.....	388	379	390	368	360	372	421	0.3%
Rail, passenger.....	5	5	5	5	5	5	5	0.4%
Rail, freight.....	38	36	39	37	35	34	33	-0.3%
Shipping, domestic.....	7	7	5	4	4	3	3	-2.9%
Shipping, international.....	52	61	55	59	64	67	73	0.5%
Recreational boats.....	17	17	19	19	20	20	21	0.7%
Air.....	168	168	200	217	233	251	287	1.6%
Military use.....	46	47	45	47	50	54	62	0.8%
Lubricants.....	5	5	5	5	5	5	5	0.1%
Pipeline fuel.....	37	37	38	39	40	41	44	0.6%
Discrepancy <sup>5</sup> .....	-37	-33	-23	-14	-8	-5	-3	-7.3%
<b>Total transportation.....</b>	<b>1,864</b>	<b>1,866</b>	<b>1,794</b>	<b>1,711</b>	<b>1,687</b>	<b>1,717</b>	<b>1,849</b>	<b>0.0%</b>
<b>Biogenic energy combustion<sup>10</sup></b>								
Biomass.....	194	174	192	197	196	202	216	0.6%
Electric power sector.....	20	9	16	22	22	24	30	3.6%
Other sectors.....	175	165	177	175	174	178	186	0.3%
Biogenic waste.....	22	24	26	25	25	26	28	0.5%
Biofuels heat and coproducts.....	80	84	81	80	78	79	75	-0.3%
Ethanol.....	79	80	77	74	73	73	83	0.1%
Biodiesel.....	16	20	13	7	7	7	7	-3.0%
Liquids from biomass.....	0	0	1	1	1	1	1	5.7%
Renewable diesel and gasoline.....	0	0	15	21	21	21	21	--
<b>Total.....</b>	<b>392</b>	<b>383</b>	<b>405</b>	<b>404</b>	<b>401</b>	<b>409</b>	<b>431</b>	<b>0.3%</b>

<sup>1</sup>Does not include water heating portion of load.

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

<sup>3</sup>Includes desktop and laptop computers, monitors, and networking equipment.

<sup>4</sup>Includes small electric devices, heating elements, outdoor grills, exterior lights, pool heaters, spa heaters, backup electricity generators, and motors not listed above. Electric vehicles are included in the transportation sector.

<sup>5</sup>Represents 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.

<sup>6</sup>Includes emissions related to fuel consumption for district services.

<sup>7</sup>Includes 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).

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

<sup>9</sup>Commercial trucks 8,501 to 10,000 pounds gross vehicle weight rating.

<sup>10</sup>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. 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 2015 are model results and may differ from official EIA data reports.

Sources: 2015 emissions and emission factors: U.S. Energy Information Administration (EIA), *Monthly Energy Review*, October 2016. 2016: EIA, *Short-Term Energy Outlook*, October 2016 and EIA, AEO2017 National Energy Modeling System run ref2017.d120816a. Projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a.

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

Indicators	Reference case							Annual growth 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Real gross domestic product .....</b>	<b>16,397</b>	<b>16,652</b>	<b>20,558</b>	<b>22,585</b>	<b>25,054</b>	<b>27,852</b>	<b>33,653</b>	<b>2.1%</b>
<b>Components of real gross domestic product</b>								
Real consumption .....	11,215	11,522	14,402	15,952	17,759	19,851	24,332	2.2%
Real investment .....	2,869	2,816	3,913	4,319	4,886	5,477	6,806	2.6%
Real government spending .....	2,884	2,919	3,036	3,188	3,379	3,585	4,013	0.9%
Real exports .....	2,121	2,114	3,242	3,950	4,803	5,729	7,685	3.9%
Real imports .....	2,661	2,692	4,015	4,817	5,766	6,775	9,200	3.7%
<b>Energy intensity</b> <b>(thousand Btu per 2009 dollar of GDP)</b>								
Delivered energy .....	4.36	4.30	3.63	3.26	2.96	2.73	2.40	-1.7%
Total energy .....	5.91	5.79	4.88	4.37	3.96	3.64	3.17	-1.8%
<b>Price indices</b>								
GDP chain-type price index (2009=1.00) .....	1.10	1.12	1.35	1.51	1.67	1.83	2.26	2.1%
Consumer price index (1982-4=1.00)								
All-urban .....	2.37	2.40	3.00	3.40	3.82	4.26	5.40	2.4%
Energy commodities and services .....	2.03	1.87	2.84	3.29	3.74	4.23	5.46	3.2%
Wholesale price index (1982=1.00)								
All commodities .....	1.90	1.85	2.31	2.53	2.74	2.94	3.46	1.9%
Fuel and power .....	1.60	1.44	2.35	2.76	3.13	3.52	4.60	3.5%
Metals and metal products .....	2.00	1.93	2.26	2.30	2.38	2.46	2.66	0.9%
Industrial commodities excluding energy .....	1.94	1.93	2.26	2.44	2.60	2.76	3.15	1.4%
<b>Interest rates (percent, nominal)</b>								
Federal funds rate .....	0.13	0.42	3.07	2.93	2.98	2.99	2.96	--
10-year treasury note .....	2.14	1.73	3.82	3.75	3.76	3.76	3.74	--
AA utility bond rate .....	3.99	3.65	5.79	5.73	5.73	5.73	5.71	--
<b>Value of shipments (billion 2009 dollars)</b>								
Non-industrial and service sectors .....	23,925	24,364	30,117	33,060	36,628	40,470	48,373	2.0%
Total industrial .....	7,374	7,453	9,147	9,655	10,476	11,491	13,836	1.8%
Agriculture, mining, and construction .....	2,049	2,079	2,545	2,639	2,802	2,978	3,395	1.5%
Manufacturing .....	5,325	5,374	6,602	7,016	7,674	8,512	10,441	2.0%
Energy-intensive .....	1,867	1,898	2,223	2,292	2,402	2,555	2,890	1.2%
Non-energy-intensive .....	3,458	3,476	4,378	4,725	5,272	5,958	7,552	2.3%
<b>Total shipments .....</b>	<b>31,298</b>	<b>31,817</b>	<b>39,264</b>	<b>42,715</b>	<b>47,104</b>	<b>51,961</b>	<b>62,209</b>	<b>2.0%</b>
<b>Population and employment (millions)</b>								
Population, with armed forces overseas .....	322	324	348	360	371	381	399	0.6%
Population, aged 16 and over .....	257	259	281	292	302	311	328	0.7%
Population, aged 65 and over .....	48	50	66	74	79	82	88	1.7%
Employment, nonfarm .....	142	144	158	163	167	173	181	0.7%
Employment, manufacturing .....	12.1	12.1	13.6	13.1	12.8	12.6	12.3	0.0%
<b>Key labor indicators</b>								
Labor force (millions) .....	157	159	171	177	182	188	198	0.6%
Nonfarm labor productivity (2009=1.00) .....	1.06	1.06	1.22	1.32	1.44	1.57	1.86	1.7%
Unemployment rate (percent) .....	5.28	4.88	4.52	4.55	4.40	4.42	4.68	--
<b>Key indicators for energy demand</b>								
Real disposable personal income .....	12,343	12,663	16,041	17,848	19,717	21,866	26,219	2.2%
Housing starts (millions) .....	1.18	1.26	1.85	1.72	1.74	1.76	1.77	1.0%
Commercial floorspace (billion square feet) .....	89	90	99	105	110	116	127	1.0%
Unit sales of light-duty vehicles (millions) .....	17.4	17.5	17.6	17.8	18.4	18.7	19.8	0.4%

GDP = Gross domestic product.

Btu = British thermal unit.

-- = Not applicable.

Sources: 2015 and 2016: IHS Markit, Macroeconomic, Industry, and Employment models, August 2016. Projections: U.S. Energy Information Administration, AEO2017 National Energy Modeling System run ref2017.d120816a.

**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 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Crude oil spot prices</b>								
<b>(2016 dollars per barrel)</b>								
Brent .....	53	43	86	95	102	109	117	3.0%
West Texas Intermediate .....	49	43	80	88	96	103	110	2.8%
<b>(nominal dollars per barrel)</b>								
Brent .....	52	43	104	128	152	179	236	5.1%
West Texas Intermediate .....	49	43	97	118	143	169	223	5.0%
<b>Petroleum and other liquids consumption<sup>1</sup></b>								
OECD								
United States (50 states) .....	19.55	19.59	19.77	19.13	19.00	19.34	20.57	0.1%
United States territories .....	0.26	0.27	0.30	0.31	0.32	0.34	--	--
Canada .....	2.39	2.39	2.38	2.39	2.44	2.51	--	--
Mexico and Chile .....	2.30	2.32	2.36	2.50	2.67	2.87	--	--
OECD Europe <sup>2</sup> .....	13.83	13.88	13.57	13.65	13.79	13.98	--	--
Japan .....	4.14	4.08	3.75	3.66	3.56	3.40	--	--
South Korea .....	2.38	2.43	2.42	2.44	2.48	2.55	--	--
Australia and New Zealand .....	1.28	1.31	1.39	1.41	1.45	1.53	--	--
<b>Total OECD consumption .....</b>	<b>46.13</b>	<b>46.26</b>	<b>45.92</b>	<b>45.49</b>	<b>45.71</b>	<b>46.51</b>	--	--
Non-OECD								
Russia .....	3.35	3.20	3.79	3.75	3.73	3.59	--	--
Other Europe and Eurasia <sup>3</sup> .....	2.07	2.15	2.34	2.43	2.48	2.53	--	--
China .....	11.18	11.52	13.81	14.81	15.65	16.36	--	--
India .....	3.97	4.18	5.19	5.94	6.97	8.26	--	--
Other Asia <sup>4</sup> .....	8.13	8.35	10.33	11.39	12.70	14.26	--	--
Middle East .....	8.29	8.58	10.42	11.28	12.31	13.23	--	--
Africa .....	3.86	4.02	5.06	5.50	6.08	6.93	--	--
Brazil .....	3.15	3.18	3.74	4.06	4.39	4.71	--	--
Other Central and South America .....	3.60	3.63	4.01	4.12	4.30	4.58	--	--
<b>Total non-OECD consumption .....</b>	<b>47.60</b>	<b>48.79</b>	<b>58.69</b>	<b>63.29</b>	<b>68.61</b>	<b>74.45</b>	--	--
<b>Total consumption .....</b>	<b>93.73</b>	<b>95.05</b>	<b>104.61</b>	<b>108.77</b>	<b>114.32</b>	<b>120.96</b>	--	--
<b>Petroleum and other liquids production</b>								
OPEC <sup>5</sup>								
Middle East .....	27.59	27.75	30.83	33.09	35.91	39.04	--	--
North Africa .....	2.15	2.07	2.74	2.96	3.18	3.42	--	--
West Africa .....	4.24	4.30	4.40	4.57	4.71	5.03	--	--
South America .....	3.25	3.17	3.15	3.38	3.65	3.93	--	--
<b>Total OPEC production .....</b>	<b>37.24</b>	<b>37.28</b>	<b>41.12</b>	<b>44.01</b>	<b>47.45</b>	<b>51.42</b>	--	--
Non-OPEC								
OECD								
United States (50 states) .....	14.99	14.64	17.61	17.72	17.34	17.47	16.90	0.4%
Canada .....	4.55	4.88	5.38	5.55	5.73	6.00	--	--
Mexico and Chile .....	2.66	2.62	2.44	2.49	2.80	3.26	--	--
OECD Europe <sup>2</sup> .....	3.52	3.38	3.25	2.99	2.86	2.74	--	--
Japan and South Korea .....	0.22	0.23	0.18	0.19	0.19	0.19	--	--
Australia and New Zealand .....	0.51	0.51	0.63	0.61	0.68	0.76	--	--
<b>Total OECD production .....</b>	<b>26.44</b>	<b>26.26</b>	<b>29.49</b>	<b>29.54</b>	<b>29.60</b>	<b>30.43</b>	--	--
Non-OECD								
Russia .....	10.87	10.67	10.84	11.04	11.52	12.22	--	--
Other Europe and Eurasia <sup>3</sup> .....	3.26	3.25	4.35	4.65	4.69	4.51	--	--
China .....	4.63	4.63	5.18	5.28	5.92	6.16	--	--
Other Asia <sup>4</sup> .....	4.07	4.15	3.82	3.71	3.66	3.66	--	--
Middle East .....	1.16	1.10	0.90	0.82	0.76	0.69	--	--
Africa .....	2.26	2.23	2.50	2.65	2.71	2.76	--	--
Brazil .....	3.13	3.18	4.30	4.87	5.43	6.12	--	--
Other Central and South America .....	2.22	2.24	2.11	2.21	2.59	3.01	--	--
<b>Total non-OECD production .....</b>	<b>31.60</b>	<b>31.45</b>	<b>34.00</b>	<b>35.23</b>	<b>37.27</b>	<b>39.12</b>	--	--
<b>Total petroleum and other liquids production ....</b>	<b>95.28</b>	<b>94.99</b>	<b>104.61</b>	<b>108.77</b>	<b>114.32</b>	<b>120.96</b>	--	--
OPEC market share (percent) .....	39.1	39.2	39.3	40.5	41.5	42.5	--	--

**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 2016-2050 (percent)
	2015	2016	2025	2030	2035	2040	2050	
<b>Selected world production subtotals:</b>								
Crude oil and equivalents <sup>6</sup> .....	79.67	78.88	85.26	88.54	93.21	98.92	--	--
Tight oil.....	5.33	5.10	6.25	6.89	7.80	9.57	--	--
Bitumen <sup>7</sup> .....	2.32	2.54	3.12	3.18	3.24	3.31	--	--
Refinery processing gain <sup>8</sup> .....	2.47	2.53	2.89	3.00	3.11	3.22	--	--
Natural gas plant liquids.....	10.41	10.76	12.82	13.04	13.28	13.55	--	--
Liquids from renewable sources <sup>9</sup> .....	2.32	2.38	2.96	3.37	3.74	4.11	--	--
Liquids from coal <sup>10</sup> .....	0.25	0.25	0.16	0.26	0.36	0.50	--	--
Liquids from natural gas <sup>11</sup> .....	0.29	0.30	0.52	0.57	0.62	0.65	--	--
Liquids from kerogen <sup>12</sup> .....	0.01	0.01	0.01	0.01	0.01	0.01	--	--
<b>Crude oil production<sup>6</sup></b>								
<b>OPEC<sup>5</sup></b>								
Middle East.....	24.22	24.30	26.99	29.07	31.63	34.55	--	--
North Africa.....	1.80	1.72	2.33	2.46	2.56	2.67	--	--
West Africa.....	4.22	4.28	4.34	4.51	4.64	4.95	--	--
South America.....	3.06	2.98	2.86	3.09	3.36	3.65	--	--
<b>Total OPEC production.....</b>	<b>33.31</b>	<b>33.27</b>	<b>36.51</b>	<b>39.13</b>	<b>42.19</b>	<b>45.80</b>	--	--
<b>Non-OPEC</b>								
<b>OECD</b>								
United States (50 states).....	9.42	8.74	10.38	10.54	10.23	10.34	9.86	0.4%
Canada.....	3.72	4.05	4.42	4.53	4.69	4.96	--	--
Mexico and Chile.....	2.32	2.29	2.12	2.17	2.49	2.96	--	--
OECD Europe <sup>2</sup> .....	2.70	2.57	2.10	1.79	1.62	1.46	--	--
Japan and South Korea.....	0.00	0.00	0.00	0.00	0.00	0.00	--	--
Australia and New Zealand.....	0.39	0.38	0.50	0.48	0.56	0.64	--	--
<b>Total OECD production.....</b>	<b>18.54</b>	<b>18.04</b>	<b>19.53</b>	<b>19.52</b>	<b>19.60</b>	<b>20.36</b>	--	--
<b>Non-OECD</b>								
Russia.....	10.09	9.86	10.08	10.31	10.81	11.53	--	--
Other Europe and Eurasia <sup>3</sup> .....	3.04	3.02	4.10	4.39	4.43	4.25	--	--
China.....	4.25	4.23	4.40	4.23	4.63	4.58	--	--
Other Asia <sup>4</sup> .....	3.22	3.27	2.79	2.57	2.42	2.28	--	--
Middle East.....	1.13	1.07	0.87	0.80	0.73	0.67	--	--
Africa.....	1.86	1.83	2.01	2.15	2.21	2.26	--	--
Brazil.....	2.42	2.47	3.32	3.69	4.07	4.67	--	--
Other Central and South America.....	1.81	1.81	1.65	1.74	2.12	2.52	--	--
<b>Total non-OECD production.....</b>	<b>27.82</b>	<b>27.57</b>	<b>29.21</b>	<b>29.88</b>	<b>31.41</b>	<b>32.75</b>	--	--
<b>Total crude oil production<sup>6</sup>.....</b>	<b>79.67</b>	<b>78.88</b>	<b>85.26</b>	<b>88.54</b>	<b>93.21</b>	<b>98.92</b>	--	--
OPEC market share (percent).....	41.8	42.2	42.8	44.2	45.3	46.3	--	--

<sup>1</sup>Estimated consumption. Includes both OPEC and non-OPEC consumers in the regional breakdown.

<sup>2</sup>OECD Europe = Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

<sup>3</sup>Other Europe and Eurasia = Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Kazakhstan, Kosovo, Kyrgyzstan, Latvia, Lithuania, Macedonia, Malta, Moldova, Montenegro, Romania, Serbia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

<sup>4</sup>Other Asia = Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia (Kampuchea), Fiji, French Polynesia, Guam, Hong Kong, India (for production), Indonesia, Kiribati, Laos, Malaysia, Macau, Maldives, Mongolia, Myanmar (Burma), Nauru, Nepal, New Caledonia, Niue, North Korea, Pakistan, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Sri Lanka, Taiwan, Thailand, Tonga, Vanuatu, and Vietnam.

<sup>5</sup>OPEC = Organization of the Petroleum Exporting Countries = Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

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

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

<sup>8</sup>The 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.

<sup>9</sup>Includes liquids produced from energy crops.

<sup>10</sup>Includes liquids converted from coal via the Fischer-Tropsch coal-to-liquids process.

<sup>11</sup>Includes liquids converted from natural gas via the Fischer-Tropsch gas-to-liquids process.

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

OECD = Organization for Economic Cooperation and Development.

-- = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2015 are model results and may differ from official EIA data reports.

Sources: 2015 Brent and West Texas Intermediate crude oil spot prices: Thomson Reuters. 2015 quantities and projections: EIA, AEO2017 National Energy Modeling System run ref2017.d120816a and EIA, Generate World Oil Balance application.