

## Appendix D

### Results from side cases

Table D1. Key results for Clean Power Plan cases

Capacity, generation, prices, consumption, and emissions	2015	2020					
		Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended
<b>Net summer capacity (gigawatts)<sup>1</sup></b>							
<b>Capacity</b>							
Electric power sector <sup>2</sup> .....	1,040.8	1,053.0	1,053.2	1,054.4	1,052.6	1,054.8	1,048.5
Coal <sup>3</sup> .....	281.4	211.7	211.7	212.1	211.8	212.3	205.9
Oil and natural gas steam <sup>3,4</sup> .....	91.4	90.3	90.3	91.2	90.5	91.0	90.9
Combined cycle .....	227.3	247.5	247.1	247.5	246.4	247.4	248.5
Combustion turbine/diesel .....	141.2	142.9	143.4	142.9	143.2	143.3	143.1
Nuclear power .....	99.8	99.1	99.1	99.1	99.1	99.1	99.1
Solar <sup>5</sup> .....	13.8	28.0	28.1	28.0	28.1	28.1	27.5
Wind .....	74.4	120.4	120.4	120.4	120.4	120.4	120.4
Other renewable energy <sup>6</sup> .....	89.0	90.3	90.3	90.3	90.3	90.3	90.3
Other <sup>7</sup> .....	22.6	22.9	22.9	22.9	22.9	22.9	22.9
End-use sector <sup>8</sup> .....	41.3	61.1	61.1	61.2	61.1	61.2	62.0
<b>Total capacity</b> .....	<b>1,082.1</b>	<b>1,114.2</b>	<b>1,114.4</b>	<b>1,115.5</b>	<b>1,113.8</b>	<b>1,115.9</b>	<b>1,110.6</b>
<b>Capacity additions (gigawatts)<sup>9</sup></b>							
Electric power sector <sup>2</sup> .....	--	101.1	101.0	101.3	101.0	101.3	102.4
Coal <sup>3</sup> .....	--	0.5	0.5	0.5	0.5	0.5	0.5
Combined cycle .....	--	26.7	26.3	26.8	26.3	26.7	28.1
Combustion turbine/diesel .....	--	7.3	7.4	7.3	7.4	7.3	7.7
Nuclear power .....	--	4.4	4.4	4.4	4.4	4.4	4.4
Solar <sup>5</sup> .....	--	14.2	14.4	14.2	14.4	14.4	13.8
Wind .....	--	46.1	46.1	46.1	46.1	46.1	46.1
Other renewable energy <sup>6</sup> .....	--	1.7	1.7	1.7	1.7	1.7	1.7
Other <sup>7</sup> .....	--	0.2	0.3	0.2	0.3	0.2	0.2
End-use sector <sup>8</sup> .....	--	21.0	21.0	21.0	21.0	21.0	21.1
<b>Total capacity additions</b> .....	<b>--</b>	<b>122.1</b>	<b>122.1</b>	<b>122.3</b>	<b>122.1</b>	<b>122.3</b>	<b>123.5</b>
<b>Capacity retirements (gigawatts)<sup>9</sup></b>							
Electric power sector <sup>2</sup> .....	--	88.9	88.6	87.7	89.2	87.4	94.7
Coal <sup>3</sup> .....	--	61.6	61.6	61.2	61.5	61.0	67.4
Oil and natural gas steam <sup>3,4</sup> .....	--	9.7	9.7	8.8	9.5	9.0	9.1
Combined cycle .....	--	6.5	6.5	6.6	7.2	6.6	6.9
Combustion turbine/diesel .....	--	5.5	5.3	5.6	5.4	5.2	5.8
Nuclear power .....	--	5.2	5.2	5.2	5.2	5.2	5.2
Renewable energy <sup>10</sup> .....	--	0.4	0.4	0.4	0.4	0.4	0.4
Fuel cells .....	--	0.0	0.0	0.0	0.0	0.0	0.0
End-use sector <sup>8</sup> .....	--	1.2	1.2	1.2	1.2	1.2	0.4
<b>Total capacity retirements</b> .....	<b>--</b>	<b>90.1</b>	<b>89.9</b>	<b>89.0</b>	<b>90.5</b>	<b>88.6</b>	<b>95.1</b>
<b>Total net electricity generation by fuel (billion kilowatthours)</b>							
Coal .....	1,355	1,388	1,389	1,389	1,389	1,388	1,366
Petroleum .....	26	15	15	15	15	15	15
Natural gas .....	1,348	1,201	1,199	1,199	1,199	1,201	1,220
Nuclear power .....	798	777	777	777	777	777	777
Solar <sup>5</sup> .....	38	93	93	93	93	93	92
Wind .....	190	368	368	368	367	368	368
Other renewable energy <sup>6</sup> .....	319	376	375	376	375	376	376
Other <sup>11</sup> .....	17	27	27	27	27	27	27
<b>Total net electricity generation</b> .....	<b>4,090</b>	<b>4,244</b>	<b>4,243</b>	<b>4,244</b>	<b>4,243</b>	<b>4,245</b>	<b>4,240</b>
<b>Fuel prices to the electric power sector<sup>2</sup> (2015 dollars per million Btu)</b>							
Natural gas .....	3.26	4.69	4.69	4.68	4.69	4.68	4.76
Steam coal .....	2.19	2.26	2.26	2.26	2.26	2.26	2.27
<b>Electricity prices (2015 cents per kilowatthour)</b>							
Residential .....	12.4	12.9	12.9	12.9	12.9	12.9	12.9
Commercial .....	10.5	10.7	10.7	10.7	10.7	10.7	10.8
Industrial .....	6.9	7.1	7.1	7.1	7.1	7.1	7.2
Transportation .....	10.1	11.3	11.3	11.3	11.3	11.3	11.3
<b>All sectors average price</b> .....	<b>10.3</b>	<b>10.5</b>	<b>10.5</b>	<b>10.5</b>	<b>10.5</b>	<b>10.5</b>	<b>10.6</b>

2030						2040					
Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended	Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended
1,094.2	1,139.1	1,107.1	1,138.9	1,088.9	1,107.9	1,239.6	1,252.2	1,259.0	1,251.4	1,242.6	1,250.4
180.3	186.6	185.6	188.2	179.4	174.9	172.8	186.6	178.9	188.2	172.3	152.7
54.5	66.0	52.7	62.8	53.4	52.1	52.8	63.3	50.0	60.7	49.8	49.6
294.5	259.0	280.1	258.6	290.9	294.9	345.4	303.5	331.4	302.0	340.5	352.9
137.0	137.1	139.9	136.2	138.2	135.1	144.6	147.9	145.5	146.8	146.3	141.5
99.1	99.1	99.1	99.1	99.1	99.1	99.1	99.1	99.1	99.1	99.1	99.1
70.1	109.6	90.2	112.2	69.0	90.2	158.1	164.0	189.0	166.9	166.9	184.5
142.0	164.6	142.9	164.6	142.1	144.6	145.8	167.2	144.3	167.2	146.9	149.4
93.1	93.7	92.9	93.6	93.1	93.3	95.5	95.6	95.4	95.5	95.4	95.7
23.7	23.5	23.6	23.5	23.6	23.6	25.5	25.1	25.4	25.1	25.4	25.0
93.9	94.0	94.0	93.9	95.0	94.6	134.5	135.0	134.3	135.0	136.6	136.3
<b>1,188.1</b>	<b>1,233.1</b>	<b>1,201.0</b>	<b>1,232.8</b>	<b>1,184.0</b>	<b>1,202.5</b>	<b>1,374.1</b>	<b>1,387.2</b>	<b>1,393.2</b>	<b>1,386.4</b>	<b>1,379.2</b>	<b>1,386.6</b>
227.4	249.2	234.5	252.4	223.9	252.9	388.6	367.7	402.5	369.6	393.8	432.4
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
84.9	44.3	70.2	44.6	82.4	86.1	138.6	89.8	123.6	89.1	133.6	150.4
8.0	8.0	9.1	8.2	8.0	9.5	19.5	20.3	19.2	20.3	19.9	21.6
4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
56.4	95.8	76.4	98.5	55.3	76.5	144.3	150.3	175.2	153.2	153.1	170.7
67.7	90.3	68.6	90.3	67.8	70.3	71.5	92.9	70.1	92.9	72.7	75.2
4.5	5.0	4.3	5.0	4.5	4.7	6.9	7.0	6.8	6.9	6.8	7.1
1.0	0.9	0.9	0.9	0.9	1.0	2.9	2.5	2.8	2.4	2.7	2.4
53.8	53.9	53.8	53.8	54.9	53.7	94.3	94.9	94.1	94.9	96.5	95.3
<b>281.1</b>	<b>303.1</b>	<b>288.3</b>	<b>306.2</b>	<b>278.8</b>	<b>306.5</b>	<b>482.9</b>	<b>462.6</b>	<b>496.6</b>	<b>464.6</b>	<b>490.2</b>	<b>527.7</b>
174.0	151.0	168.3	154.4	175.8	185.9	189.8	156.3	184.4	159.1	192.0	222.9
92.1	85.8	86.7	84.2	92.9	97.4	99.6	85.8	93.5	84.2	100.1	119.7
46.4	34.9	48.2	38.1	47.5	48.8	48.1	37.6	50.9	40.2	51.1	51.3
17.7	12.5	17.4	13.3	18.8	18.5	20.5	13.6	19.5	14.4	20.4	24.9
12.2	12.2	10.4	13.2	11.0	15.6	16.0	13.7	14.8	14.6	14.8	21.3
5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.2	1.2	1.2	1.2	1.2	0.4	1.2	1.2	1.2	1.2	1.2	0.4
<b>175.2</b>	<b>152.2</b>	<b>169.5</b>	<b>155.6</b>	<b>177.0</b>	<b>186.2</b>	<b>191.0</b>	<b>157.6</b>	<b>185.6</b>	<b>160.3</b>	<b>193.2</b>	<b>223.2</b>
972	995	1,029	997	979	987	919	1,080	980	1,081	931	653
11	11	12	11	11	11	9	10	10	10	9	8
1,702	1,531	1,607	1,524	1,680	1,650	1,942	1,723	1,829	1,712	1,896	2,097
789	789	789	789	789	789	789	789	789	789	789	789
227	302	267	306	226	266	477	482	546	491	498	538
457	528	459	528	457	466	473	541	467	540	477	487
405	407	404	407	405	405	424	422	423	421	422	427
27	27	27	27	27	27	27	27	27	27	27	27
<b>4,590</b>	<b>4,591</b>	<b>4,594</b>	<b>4,591</b>	<b>4,574</b>	<b>4,601</b>	<b>5,060</b>	<b>5,074</b>	<b>5,071</b>	<b>5,071</b>	<b>5,050</b>	<b>5,025</b>
5.57	5.32	5.42	5.31	5.57	5.33	5.36	5.07	5.14	5.07	5.35	5.58
2.26	2.29	2.27	2.29	2.28	2.26	2.38	2.46	2.37	2.46	2.40	2.26
13.4	13.5	13.4	13.4	13.6	13.3	13.0	13.0	12.9	13.0	13.1	13.4
11.0	11.0	11.0	11.0	11.2	10.9	10.5	10.5	10.4	10.5	10.6	10.8
7.5	7.6	7.5	7.5	7.7	7.4	7.2	7.2	7.2	7.2	7.3	7.5
12.7	12.7	12.7	12.6	13.0	12.6	12.1	12.0	12.0	12.0	12.2	12.5
<b>10.9</b>	<b>10.9</b>	<b>10.9</b>	<b>10.9</b>	<b>11.1</b>	<b>10.8</b>	<b>10.5</b>	<b>10.5</b>	<b>10.4</b>	<b>10.4</b>	<b>10.6</b>	<b>10.8</b>

Table D1. Key results for Clean Power Plan cases (*continued*)

Capacity, generation, prices, consumption, and emissions	2015	2020					
		Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended
Energy consumption (quadrillion Btu)							
Residential							
Petroleum and other liquids <sup>12</sup> .....	0.93	0.86	0.86	0.86	0.86	0.86	0.86
Natural gas .....	4.77	4.87	4.87	4.87	4.87	4.87	4.86
Renewable energy <sup>13</sup> .....	0.44	0.42	0.42	0.42	0.42	0.42	0.42
Electricity .....	4.78	4.76	4.76	4.76	4.76	4.76	4.76
Total residential .....	10.92	10.90	10.90	10.90	10.90	10.90	10.89
Nonmarketed residential renewable energy <sup>14</sup> .....	0.11	0.35	0.35	0.35	0.35	0.35	0.35
Commercial							
Petroleum and other liquids <sup>15</sup> .....	0.66	0.70	0.70	0.70	0.70	0.70	0.70
Natural gas .....	3.32	3.45	3.45	3.45	3.45	3.45	3.45
Coal .....	0.06	0.05	0.05	0.05	0.05	0.05	0.05
Renewable energy <sup>16</sup> .....	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Electricity .....	4.64	4.69	4.69	4.69	4.69	4.69	4.68
Total commercial .....	8.81	9.03	9.03	9.03	9.03	9.03	9.03
Nonmarketed commercial renewable energy <sup>14</sup> .....	0.16	0.18	0.18	0.18	0.18	0.18	0.18
Industrial <sup>8</sup>							
Petroleum and other liquids <sup>17</sup> .....	8.07	9.40	9.40	9.40	9.39	9.40	9.39
Natural gas .....	9.38	10.57	10.57	10.57	10.57	10.57	10.56
Coal .....	1.34	1.23	1.23	1.23	1.23	1.23	1.22
Renewable energy <sup>18</sup> .....	2.26	2.30	2.30	2.30	2.30	2.30	2.30
Electricity .....	3.27	3.61	3.61	3.61	3.61	3.61	3.61
Total industrial .....	24.33	27.11	27.11	27.10	27.10	27.11	27.08
Transportation							
Petroleum and other liquids <sup>19</sup> .....	27.14	27.32	27.32	27.32	27.32	27.32	27.31
Pipeline fuel natural gas .....	0.89	0.83	0.83	0.83	0.83	0.83	0.83
Compressed / liquefied natural gas .....	0.07	0.08	0.08	0.08	0.08	0.08	0.08
Liquid hydrogen .....	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Electricity .....	0.03	0.05	0.05	0.05	0.05	0.05	0.05
Total transportation .....	28.13	28.29	28.29	28.29	28.29	28.29	28.28
Unspecified sector <sup>20</sup> .....	-0.58	-0.58	-0.58	-0.58	-0.58	-0.58	-0.58
Electric power <sup>2</sup>							
Petroleum and other liquids <sup>21</sup> .....	0.26	0.15	0.15	0.15	0.15	0.15	0.15
Natural gas .....	9.89	8.50	8.49	8.49	8.49	8.50	8.59
Steam coal .....	14.08	14.34	14.36	14.36	14.37	14.35	14.09
Nuclear / uranium <sup>22</sup> .....	8.34	8.12	8.12	8.12	8.12	8.12	8.12
Renewable energy <sup>23</sup> .....	4.86	7.37	7.34	7.37	7.36	7.37	7.36
Non-biogenic municipal waste .....	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Net electricity imports .....	0.19	0.19	0.20	0.20	0.20	0.19	0.20
Total electric power .....	37.85	38.90	38.89	38.91	38.91	38.91	38.73
Total marketed energy consumption .....							
Petroleum and other liquids .....	36.49	37.85	37.85	37.85	37.85	37.85	37.83
Natural gas .....	28.31	28.30	28.29	28.29	28.29	28.30	28.38
Coal .....	15.48	15.62	15.64	15.64	15.65	15.63	15.36
Nuclear / uranium <sup>22</sup> .....	8.34	8.12	8.12	8.12	8.12	8.12	8.12
Renewable energy <sup>24</sup> .....	7.71	10.22	10.20	10.23	10.21	10.23	10.22
Other <sup>25</sup> .....	0.42	0.43	0.43	0.43	0.43	0.43	0.43
Total marketed energy consumption .....	96.74	100.55	100.54	100.56	100.55	100.55	100.34

2030						2040					
Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended	Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended
0.72	0.72	0.72	0.72	0.72	0.72	0.61	0.61	0.61	0.61	0.61	0.61
4.80	4.81	4.81	4.81	4.80	4.81	4.73	4.75	4.74	4.75	4.73	4.72
0.39	0.39	0.39	0.39	0.39	0.39	0.37	0.37	0.37	0.37	0.37	0.37
4.83	4.82	4.83	4.83	4.81	4.84	5.20	5.19	5.21	5.20	5.18	5.16
<b>10.74</b>	<b>10.74</b>	<b>10.75</b>	<b>10.75</b>	<b>10.72</b>	<b>10.76</b>	<b>10.91</b>	<b>10.92</b>	<b>10.93</b>	<b>10.93</b>	<b>10.89</b>	<b>10.86</b>
0.63	0.63	0.63	0.63	0.64	0.63	0.94	0.94	0.93	0.94	0.95	0.94
0.68	0.68	0.68	0.68	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.67
3.53	3.55	3.55	3.55	3.54	3.56	3.81	3.84	3.83	3.84	3.83	3.81
0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
5.09	5.08	5.08	5.08	5.06	5.09	5.62	5.62	5.63	5.62	5.60	5.58
<b>9.49</b>	<b>9.50</b>	<b>9.51</b>	<b>9.51</b>	<b>9.48</b>	<b>9.53</b>	<b>10.28</b>	<b>10.31</b>	<b>10.32</b>	<b>10.32</b>	<b>10.28</b>	<b>10.25</b>
0.29	0.29	0.29	0.29	0.29	0.29	0.47	0.47	0.47	0.47	0.48	0.47
10.55	10.61	10.59	10.62	10.56	10.57	11.82	11.96	11.90	11.97	11.85	11.68
11.72	11.82	11.77	11.81	11.74	11.74	12.89	13.02	12.96	13.03	12.93	12.79
1.35	1.34	1.35	1.33	1.40	1.32	1.34	1.33	1.35	1.33	1.38	1.31
2.47	2.47	2.47	2.47	2.47	2.47	2.63	2.64	2.63	2.64	2.63	2.61
3.98	3.99	3.99	3.99	3.97	3.99	4.26	4.30	4.28	4.30	4.25	4.21
<b>30.07</b>	<b>30.23</b>	<b>30.18</b>	<b>30.23</b>	<b>30.13</b>	<b>30.11</b>	<b>32.94</b>	<b>33.26</b>	<b>33.13</b>	<b>33.28</b>	<b>33.04</b>	<b>32.60</b>
25.01	25.03	25.04	25.03	25.01	25.01	24.75	24.81	24.77	24.81	24.77	24.66
0.94	0.93	0.93	0.92	0.94	0.93	1.07	1.05	1.05	1.05	1.07	1.08
0.17	0.17	0.17	0.17	0.17	0.17	0.59	0.61	0.61	0.61	0.59	0.59
0.04	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06
0.11	0.11	0.11	0.11	0.11	0.11	0.15	0.15	0.15	0.15	0.15	0.15
<b>26.28</b>	<b>26.28</b>	<b>26.29</b>	<b>26.28</b>	<b>26.28</b>	<b>26.27</b>	<b>26.63</b>	<b>26.69</b>	<b>26.65</b>	<b>26.70</b>	<b>26.64</b>	<b>26.54</b>
<b>-0.46</b>	<b>-0.46</b>	<b>-0.46</b>	<b>-0.46</b>	<b>-0.46</b>	<b>-0.46</b>	<b>-0.42</b>	<b>-0.42</b>	<b>-0.42</b>	<b>-0.42</b>	<b>-0.42</b>	<b>-0.41</b>
0.11	0.11	0.11	0.11	0.11	0.11	0.09	0.09	0.09	0.09	0.09	0.07
11.34	10.52	10.76	10.46	11.18	10.89	12.31	11.20	11.60	11.12	11.98	13.27
9.92	10.12	10.56	10.14	9.99	10.07	9.36	11.03	10.06	11.04	9.48	6.60
8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25
9.41	10.74	9.81	10.79	9.39	9.85	11.67	12.25	12.29	12.34	11.86	12.36
0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
0.17	0.17	0.17	0.17	0.17	0.17	0.15	0.15	0.15	0.15	0.15	0.15
<b>39.42</b>	<b>40.13</b>	<b>39.89</b>	<b>40.15</b>	<b>39.31</b>	<b>39.56</b>	<b>42.04</b>	<b>43.19</b>	<b>42.65</b>	<b>43.20</b>	<b>42.03</b>	<b>40.93</b>
36.62	36.69	36.69	36.70	36.63	36.64	37.52	37.73	37.63	37.73	37.56	37.28
32.51	31.79	31.99	31.73	32.37	32.10	35.39	34.47	34.79	34.41	35.12	36.25
11.32	11.51	11.97	11.53	11.44	11.45	10.75	12.41	11.46	12.42	10.91	7.97
8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25
12.41	13.74	12.81	13.79	12.39	12.85	14.80	15.40	15.42	15.48	14.99	15.47
0.44	0.44	0.44	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.43
<b>101.54</b>	<b>102.42</b>	<b>102.14</b>	<b>102.44</b>	<b>101.51</b>	<b>101.73</b>	<b>107.15</b>	<b>108.69</b>	<b>107.98</b>	<b>108.73</b>	<b>107.27</b>	<b>105.65</b>

**Table D1. Key results for Clean Power Plan cases (continued)**

Capacity, generation, prices, consumption, and emissions	2015	2020					
		Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended
Carbon dioxide emissions (million metric tons)							
by sector							
Residential .....	1,028	981	982	982	982	981	974
Commercial .....	918	893	893	893	893	893	885
Industrial <sup>8</sup> .....	1,472	1,558	1,559	1,558	1,559	1,558	1,551
Transportation .....	1,855	1,857	1,858	1,857	1,857	1,857	1,857
Total carbon dioxide emissions .....	5,273	5,289	5,291	5,290	5,291	5,290	5,267
Electric power sector							
Petroleum .....	20	11	11	11	11	11	11
Natural gas .....	524	451	450	450	450	451	456
Coal .....	1,340	1,360	1,362	1,362	1,363	1,361	1,336
Other <sup>26</sup> .....	6	6	6	6	6	6	6
Total electric power sector .....	1,891	1,829	1,830	1,830	1,831	1,829	1,809

<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>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.

<sup>4</sup>Includes oil-, gas-, and dual-fired capacity.

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

<sup>6</sup>Includes conventional hydroelectric, geothermal, wood, wood waste, municipal waste, landfill gas, and other biomass. Facilities co-firing biomass and coal are classified as coal.

<sup>7</sup>Includes pumped storage, fuel cells, and distributed generation.

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

<sup>9</sup>Cumulative after December 31, 2015.

<sup>10</sup>Includes conventional hydroelectric, geothermal, wood, wood waste, municipal waste, landfill gas, other biomass, solar, and wind power. Facilities co-firing biomass and coal are classified as coal.

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

<sup>12</sup>Includes propane, kerosene, and distillate fuel oil.

<sup>13</sup>Includes wood used for residential heating. Excludes nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.

<sup>14</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.

<sup>15</sup>Includes propane, motor gasoline (including ethanol and ethers), kerosene, distillate fuel oil, and residual fuel oil.

<sup>16</sup>Includes commercial sector consumption of wood and wood waste, landfill gas, municipal waste, and other biomass for combined heat and power. Excludes nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.

<sup>17</sup>Includes ethane, propane, butane, isobutane, natural gasoline, refinery olefins, motor gasoline (including ethanol and ethers), distillate fuel oil, residual fuel oil, petroleum coke, asphalt, road oil, lubricants, still gas, and miscellaneous petroleum products.

<sup>18</sup>Includes consumption of energy produced from hydroelectric, wood and wood waste, municipal waste, and other biomass sources, and all biomass input to liquid fuel conversion processes net of the liquid fuel produced.

<sup>19</sup>Includes propane, motor gasoline (including ethanol and ethers), jet fuel, distillate fuel oil, residual fuel oil, lubricants, and aviation gasoline.

<sup>20</sup>Represents consumption unattributed to the sectors above.

<sup>21</sup>Includes distillate fuel oil and residual fuel oil.

<sup>22</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>23</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>24</sup>Includes conventional hydroelectric, geothermal, wood and wood waste, biogenic municipal waste, other biomass, wind, photovoltaic, and solar thermal sources, and all biomass input to liquid fuel conversion processes net of the liquid fuel produced. Excludes net electricity imports and nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.

<sup>25</sup>Includes non-biogenic municipal waste, liquid hydrogen, and net electricity imports.

<sup>26</sup>Includes emissions from geothermal power and non-biogenic emissions from municipal waste.

CPP = Clean Power Plan.

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.

Source: 2015: U.S. Energy Information Administration, (EIA), *Short-Term Energy Outlook*, February 2016 and EIA, AEO2016 National Energy Modeling System run ref2016.d032416a. Projections: EIA, AEO2016 National Energy Modeling System, runs ref2016.d032416a, ref\_rate.d032416A, ref\_trade.d032416a, ref\_hybrid.d032416a, ref\_allow\_gen.d032416a, and ref\_extend.d050416a.

2030						2040					
Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended	Reference	CPP Rate	CPP Interregional Trading	CPP Hybrid	CPP Allocation to Generators	CPP Extended
841	833	850	832	840	838	821	855	831	854	820	750
807	799	817	799	806	805	826	864	837	863	825	749
1,587	1,586	1,599	1,585	1,593	1,583	1,660	1,700	1,674	1,700	1,665	1,586
1,726	1,726	1,728	1,726	1,726	1,726	1,737	1,742	1,738	1,742	1,738	1,728
<b>4,961</b>	<b>4,944</b>	<b>4,994</b>	<b>4,943</b>	<b>4,966</b>	<b>4,952</b>	<b>5,044</b>	<b>5,162</b>	<b>5,080</b>	<b>5,159</b>	<b>5,047</b>	<b>4,813</b>
8	8	8	8	8	8	6	7	7	7	6	6
602	558	571	555	593	578	653	594	615	590	636	704
943	962	1,000	965	949	958	885	1,045	949	1,045	897	623
6	6	6	6	6	6	6	6	6	6	6	6
<b>1,559</b>	<b>1,535</b>	<b>1,585</b>	<b>1,534</b>	<b>1,557</b>	<b>1,550</b>	<b>1,551</b>	<b>1,652</b>	<b>1,578</b>	<b>1,649</b>	<b>1,545</b>	<b>1,339</b>

**Table D2. Key transportation results for the Phase 2 Standards case**

Key indicators, consumption, and emissions	2015	2020		2030		2040	
		Reference	Phase 2 Standards	Reference	Phase 2 Standards	Reference	Phase 2 Standards
<b>Average fuel efficiency of new trucks (miles per gallon)</b>							
Light medium							
Diesel .....	14.3	15.5	15.6	15.6	19.0	15.7	19.2
Motor gasoline .....	10.4	10.8	11.5	10.8	14.3	10.9	14.7
Propane.....	10.0	10.3	12.3	10.9	16.2	11.0	16.3
Compressed / liquefied natural gas .....	9.3	9.9	11.5	10.6	15.0	10.6	14.8
Light medium average.....	13.4	14.4	14.7	14.5	18.0	14.5	18.3
Medium							
Diesel .....	8.9	9.2	10.0	9.2	12.9	9.2	13.1
Motor gasoline .....	6.4	6.5	7.3	6.6	9.1	6.7	9.3
Propane.....	6.6	6.7	6.9	7.0	8.6	7.0	8.8
Compressed / liquefied natural gas .....	6.5	6.6	7.2	6.6	9.1	6.7	9.3
Medium average.....	8.3	8.5	9.3	8.6	12.0	8.7	12.2
Heavy							
Diesel .....	6.3	6.8	7.2	6.9	8.8	7.0	9.1
Motor gasoline .....	5.7	5.9	6.5	5.9	7.8	6.1	8.0
Propane.....	5.2	5.4	5.5	5.5	6.7	5.8	6.9
Compressed / liquefied natural gas .....	5.9	6.3	6.6	6.4	8.0	6.4	8.0
Heavy average .....	6.3	6.8	7.2	6.9	8.8	6.9	9.0
<b>Average new truck fuel efficiency .....</b>	<b>7.1</b>	<b>7.7</b>	<b>8.2</b>	<b>7.9</b>	<b>10.3</b>	<b>8.0</b>	<b>10.6</b>
<b>New truck sales (thousands)</b>							
Light medium							
Diesel .....	136	148	148	157	157	185	186
Motor gasoline .....	52	54	54	54	54	63	63
Propane.....	0	0	0	0	0	1	1
Compressed / liquefied natural gas .....	0	0	0	1	1	5	4
Light medium subtotal .....	188	202	202	212	212	253	253
Medium							
Diesel .....	133	165	165	181	181	200	201
Motor gasoline .....	51	60	60	62	62	67	67
Propane.....	0	0	0	1	0	2	2
Compressed / liquefied natural gas .....	0	1	1	1	1	1	1
Medium subtotal .....	184	225	225	244	244	269	270
Heavy							
Diesel .....	261	242	243	226	229	219	245
Motor gasoline .....	11	10	10	10	10	10	11
Propane.....	0	0	0	0	0	1	1
Compressed / liquefied natural gas .....	2	2	2	4	2	35	10
Heavy subtotal.....	275	254	255	241	241	265	266
<b>Total new truck sales.....</b>	<b>647</b>	<b>681</b>	<b>682</b>	<b>697</b>	<b>698</b>	<b>787</b>	<b>790</b>
<b>Freight truck stock (millions)</b>							
Light medium .....	3.17	3.91	3.91	5.02	5.02	5.83	5.84
Medium.....	3.19	3.68	3.68	4.68	4.68	5.46	5.47
Heavy .....	4.58	5.19	5.19	5.60	5.60	5.91	5.92
<b>Total freight truck stock.....</b>	<b>10.93</b>	<b>12.77</b>	<b>12.77</b>	<b>15.29</b>	<b>15.30</b>	<b>17.20</b>	<b>17.22</b>
<b>Freight truck vehicle miles traveled (billion miles)</b>							
Light medium .....	49.4	52.7	52.7	64.2	64.0	78.9	78.6
Medium.....	47.8	54.3	54.3	75.2	75.1	91.3	91.0
Heavy .....	182.6	197.2	197.3	209.5	209.1	236.6	235.6
<b>Total freight truck vehicle miles traveled .....</b>	<b>279.8</b>	<b>304.2</b>	<b>304.4</b>	<b>348.9</b>	<b>348.2</b>	<b>406.8</b>	<b>405.1</b>
<b>Freight truck fuel efficiency (miles per gallon)</b>							
Light medium .....	12.3	12.9	12.9	13.8	15.3	14.1	17.2
Medium.....	7.8	8.1	8.2	8.4	10.1	8.5	11.3
Heavy .....	6.0	6.3	6.4	6.7	7.7	6.8	8.6
<b>Total freight truck fuel efficiency .....</b>	<b>6.9</b>	<b>7.3</b>	<b>7.4</b>	<b>7.8</b>	<b>9.0</b>	<b>8.0</b>	<b>10.2</b>
<b>Freight truck fuel consumption (quadrillion Btu)</b>							
Light medium .....	0.54	0.55	0.55	0.63	0.56	0.75	0.62
Medium.....	0.82	0.90	0.88	1.21	1.00	1.46	1.08
Heavy .....	4.20	4.31	4.24	4.32	3.74	4.78	3.77
<b>Total freight truck fuel consumption.....</b>	<b>5.57</b>	<b>5.76</b>	<b>5.67</b>	<b>6.16</b>	<b>5.30</b>	<b>6.98</b>	<b>5.46</b>

Table D2. Key transportation results for the Phase 2 Standards case (*continued*)

Key indicators, consumption, and emissions	2015	2020		2030		2040	
		Reference	Phase 2 Standards	Reference	Phase 2 Standards	Reference	Phase 2 Standards
Fuel consumption (quadrillion Btu)							
Transportation sector .....	28.13	28.29	28.21	26.28	25.43	26.63	25.08
Propane.....	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Motor gasoline.....	17.01	16.79	16.79	13.62	13.55	12.55	12.40
of which: ethanol .....	1.18	1.19	1.19	1.12	1.12	1.24	1.23
Jet fuel <sup>1</sup> .....	2.84	2.99	2.99	3.32	3.32	3.56	3.56
Distillate fuel oil <sup>2</sup> .....	6.67	6.99	6.91	7.49	6.73	8.01	6.92
Other petroleum <sup>3</sup> .....	0.60	0.53	0.53	0.58	0.58	0.62	0.62
Petroleum and other liquids subtotal .....	27.14	27.32	27.24	25.01	24.18	24.75	23.52
Pipeline fuel natural gas .....	0.89	0.83	0.83	0.94	0.94	1.07	1.03
Compressed / liquefied natural gas .....	0.07	0.08	0.08	0.17	0.15	0.59	0.31
Liquid hydrogen.....	0.00	0.01	0.01	0.04	0.04	0.06	0.06
Electricity .....	0.03	0.05	0.05	0.11	0.11	0.15	0.15
Total energy consumption.....	96.7	100.5	100.5	101.5	100.5	107.1	105.2
Petroleum and other liquids.....	36.5	37.8	37.8	36.6	35.6	37.5	36.0
Natural gas .....	28.3	28.3	28.2	32.5	32.4	35.4	34.9
Coal.....	15.5	15.6	15.8	11.3	11.4	10.7	10.8
Nuclear / uranium <sup>4</sup> .....	8.3	8.1	8.1	8.2	8.2	8.2	8.2
Renewable energy <sup>5</sup> .....	7.7	10.2	10.1	12.4	12.4	14.8	14.8
Other <sup>6</sup> .....	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Carbon dioxide emissions (million metric tons)							
Transportation sector .....	1,851	1,851	1,845	1,714	1,655	1,721	1,618
Petroleum <sup>7</sup> .....	1,800	1,802	1,796	1,652	1,594	1,628	1,542
Natural gas <sup>8</sup> .....	51	49	49	62	61	93	76
Total carbon dioxide emissions.....	5,273	5,289	5,295	4,961	4,894	5,044	4,929
Petroleum <sup>7</sup> .....	2,309	2,332	2,325	2,191	2,127	2,181	2,085
Natural gas .....	1,482	1,466	1,463	1,685	1,677	1,835	1,809
Coal.....	1,476	1,485	1,501	1,079	1,083	1,021	1,028
Other <sup>9</sup> .....	6	6	6	6	6	6	6

<sup>1</sup>Includes only kerosene type.<sup>2</sup>Diesel fuel for on- and off- road use.<sup>3</sup>Includes residual fuel oil, aviation gasoline and lubricants.<sup>4</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>5</sup>Includes conventional hydroelectric, geothermal, wood and wood waste, biogenic municipal waste, other biomass, wind, solar photovoltaic, and solar thermal sources, and all biomass input to liquid fuel conversion processes net of the liquid fuel produced. Excludes ethanol, net electricity imports, and nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.<sup>6</sup>Includes non-biogenic municipal waste, liquid hydrogen, and net electricity imports.<sup>7</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 2015, international bunker fuels accounted for 90 to 126 million metric tons annually.<sup>8</sup>Includes emissions from pipeline fuel natural gas and from natural gas used as fuel in motor vehicles, trains, and ships.<sup>9</sup>Includes emissions from geothermal power and non-biogenic emissions from municipal waste.

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.

Source: 2015: U.S. Energy Information Administration, (EIA), *Short-Term Energy Outlook*, February 2016 and EIA, AEO2016 National Energy Modeling System run ref2016.d032416a. Projections: EIA, AEO2016 National Energy Modeling System runs ref2016.d032416a, and phaseii.d041316a.



Table D3. Key results for extended policies case

Consumption, emissions, electricity generating capacity and generation, and prices	2015	2020		2030		2040	
		Reference	Extended Policies	Reference	Extended Policies	Reference	Extended Policies
Energy consumption (quadrillion Btu)							
Residential							
Liquid fuels and other petroleum <sup>1</sup> .....	0.93	0.86	0.86	0.72	0.70	0.61	0.59
Natural gas.....	4.77	4.87	4.85	4.80	4.63	4.73	4.43
Renewable energy <sup>2</sup> .....	0.44	0.42	0.41	0.39	0.39	0.37	0.36
Electricity.....	4.78	4.76	4.73	4.83	4.45	5.20	4.60
Total residential.....	10.92	10.90	10.86	10.74	10.17	10.91	9.98
Commercial							
Liquid fuels and other petroleum <sup>3</sup> .....	0.66	0.70	0.70	0.68	0.68	0.67	0.67
Natural gas.....	3.32	3.45	3.44	3.53	3.56	3.81	3.79
Coal.....	0.06	0.05	0.05	0.05	0.05	0.05	0.05
Renewable energy <sup>4</sup> .....	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Electricity.....	4.64	4.69	4.68	5.09	4.98	5.62	5.42
Total commercial.....	8.81	9.03	9.01	9.49	9.41	10.28	10.07
Industrial <sup>5</sup>							
Liquid fuels and other petroleum <sup>6</sup> .....	8.07	9.40	9.37	10.55	10.42	11.82	11.42
Natural gas.....	9.38	10.57	10.57	11.72	11.90	12.89	13.06
Coal.....	1.34	1.23	1.21	1.35	1.36	1.34	1.33
Renewable energy <sup>7</sup> .....	2.26	2.30	2.30	2.47	2.48	2.63	2.60
Electricity.....	3.27	3.61	3.60	3.98	3.99	4.26	4.22
Total industrial.....	24.33	27.11	27.04	30.07	30.15	32.94	32.63
Transportation							
Liquid fuels and other petroleum <sup>8</sup> .....	27.14	27.32	27.23	25.01	24.04	24.75	22.56
Pipeline fuel natural gas.....	0.89	0.83	0.84	0.94	0.91	1.07	1.01
Compressed / liquefied natural gas.....	0.07	0.08	0.08	0.17	0.14	0.59	0.32
Liquid hydrogen.....	0.00	0.01	0.01	0.04	0.04	0.06	0.06
Electricity.....	0.03	0.05	0.05	0.11	0.12	0.15	0.22
Total transportation.....	28.13	28.29	28.20	26.28	25.26	26.63	24.16
Unspecified sector <sup>9</sup> .....	-0.58	-0.58	-0.58	-0.46	-0.42	-0.42	-0.34
Electric power <sup>10</sup>							
Distillate and residual fuel oil.....	0.26	0.15	0.15	0.11	0.11	0.09	0.08
Natural gas.....	9.89	8.50	8.86	11.34	9.77	12.31	10.75
Steam coal.....	14.08	14.34	14.27	9.92	10.62	9.36	7.88
Nuclear / uranium <sup>11</sup> .....	8.34	8.12	8.12	8.25	8.25	8.25	8.25
Renewable energy <sup>12</sup> .....	4.86	7.37	6.82	9.41	9.78	11.67	13.32
Non-biogenic municipal waste.....	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Net electricity imports.....	0.19	0.19	0.20	0.17	0.17	0.15	0.15
Total electric power.....	37.85	38.90	38.64	39.42	38.92	42.04	40.64
Total energy consumption							
Liquid fuels and other petroleum.....	36.49	37.85	37.73	36.62	35.54	37.52	34.97
Natural gas.....	28.31	28.30	28.64	32.51	30.91	35.39	33.35
Steam coal.....	15.48	15.62	15.54	11.32	12.03	10.75	9.26
Nuclear / uranium <sup>11</sup> .....	8.34	8.12	8.12	8.25	8.25	8.25	8.25
Renewable energy <sup>13</sup> .....	7.71	10.22	9.67	12.41	12.78	14.80	16.42
Other <sup>14</sup> .....	0.42	0.43	0.43	0.44	0.44	0.43	0.43
Total energy consumption.....	96.74	100.55	100.13	101.54	99.95	107.15	102.67
Carbon dioxide emissions (million metric tons)							
by sector							
Residential.....	317	317	316	303	293	292	275
Commercial.....	228	238	238	241	242	254	253
Industrial <sup>5</sup> .....	986	1,054	1,052	1,144	1,145	1,226	1,210
Transportation.....	1,851	1,851	1,845	1,714	1,643	1,721	1,557
Electric power <sup>10</sup> .....	1,891	1,829	1,841	1,559	1,542	1,551	1,327
by fuel							
Petroleum <sup>15</sup> .....	2,309	2,332	2,325	2,191	2,115	2,181	2,011
Natural gas.....	1,482	1,466	1,484	1,685	1,599	1,835	1,725
Coal.....	1,476	1,485	1,477	1,079	1,146	1,021	879
Other <sup>16</sup> .....	6	6	6	6	6	6	6
Total carbon dioxide emissions.....	5,273	5,289	5,292	4,961	4,867	5,044	4,623

Table D3. Key results for extended policies case (*continued*)

Consumption, emissions, electricity generating capacity and generation, and prices	2015	2020		2030		2040	
		Reference	Extended Policies	Reference	Extended Policies	Reference	Extended Policies
<b>Electricity generating capacity (gigawatts) .....</b>	<b>1,082.1</b>	<b>1,114.2</b>	<b>1,093.9</b>	<b>1,188.1</b>	<b>1,207.0</b>	<b>1,374.1</b>	<b>1,410.3</b>
Electric power sector <sup>10</sup> .....	1,040.8	1,053.0	1,029.1	1,094.2	1,069.4	1,239.6	1,188.6
Coal .....	281.4	211.7	206.0	180.3	183.2	172.8	166.6
Oil and natural gas steam .....	91.4	90.3	91.9	54.5	47.7	52.8	39.2
Combined-cycle .....	227.3	247.5	246.4	294.5	260.0	345.4	280.1
Combustion turbine / diesel .....	141.2	142.9	141.8	137.0	127.5	144.6	121.5
Nuclear / uranium .....	99.8	99.1	99.1	99.1	99.1	99.1	99.1
Pumped storage .....	22.6	22.6	22.6	22.6	22.6	22.6	22.6
Renewable sources .....	177.1	238.7	221.1	305.2	328.8	399.4	458.2
of which: Solar .....	13.8	28.0	31.2	70.1	101.3	158.1	181.1
of which: Wind .....	74.4	120.4	99.9	142.0	134.5	145.8	181.2
Distributed generation .....	0.0	0.2	0.2	1.0	0.4	2.9	1.2
Residential and commercial sectors .....	15.2	33.8	37.1	62.0	104.0	98.2	182.6
of which: Natural gas .....	1.8	2.2	2.5	3.6	4.1	6.0	6.8
of which: Solar photovoltaic .....	11.2	28.7	28.8	55.1	84.9	88.3	149.5
of which: Wind .....	1.6	2.3	5.1	2.6	14.3	3.2	25.7
Industrial sector <sup>5</sup> .....	26.1	27.3	27.8	31.8	33.6	36.3	39.1
of which: Natural gas .....	14.7	15.2	15.7	19.2	20.9	23.5	26.2
Cumulative capacity additions (gigawatts) <sup>17</sup> .....	--	122.1	108.3	281.1	311.7	482.9	557.7
Cumulative capacity retirements (gigawatts) <sup>17</sup> .....	--	90.1	96.6	175.2	186.9	191.0	229.5
<b>Generation by fuel (billion kilowatthours) .....</b>	<b>4,090</b>	<b>4,244</b>	<b>4,234</b>	<b>4,590</b>	<b>4,511</b>	<b>5,060</b>	<b>4,943</b>
Electric power sector <sup>10</sup> .....	3,915	4,021	4,003	4,294	4,144	4,673	4,418
Coal .....	1,343	1,376	1,371	959	1,027	905	764
Petroleum .....	24	14	14	10	10	8	7
Natural gas .....	1,250	1,090	1,137	1,558	1,304	1,757	1,474
Nuclear / uranium .....	798	777	777	789	789	789	789
Pumped storage / other .....	3	3	3	3	3	3	3
Renewable sources .....	497	761	700	973	1,011	1,210	1,381
of which: Solar .....	22	52	59	148	213	350	400
of which: Wind .....	188	365	296	453	428	468	587
Distributed generation .....	0	0	0	1	0	2	1
Residential and commercial sectors .....	35	64	70	113	175	180	303
of which: Natural gas .....	13	16	18	27	30	44	49
of which: Solar photovoltaic .....	15	40	40	79	121	127	215
of which: Wind .....	2	3	7	3	19	4	34
Industrial sector <sup>5</sup> .....	140	159	161	183	192	207	222
of which: Natural gas .....	86	96	98	116	125	139	154
<b>Delivered natural gas prices</b> (2015 dollars per thousand cubic feet)							
Residential .....	10.40	11.08	11.37	12.41	12.12	12.74	12.75
Commercial .....	7.92	9.58	9.86	10.72	10.28	10.73	10.47
Industrial <sup>5</sup> .....	3.84	5.53	5.81	6.14	5.71	5.89	5.64
Electric power <sup>10</sup> .....	3.35	4.83	5.10	5.74	5.23	5.52	5.23
Average electricity price (2015 cents per kilowatthour) .....	10.3	10.5	10.6	10.9	10.8	10.5	10.4

<sup>1</sup>Includes propane, kerosene, and distillate fuel oil.<sup>2</sup>Includes wood used for residential heating. Excludes nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.<sup>3</sup>Includes propane, motor gasoline (including ethanol and ethers), kerosene, distillate fuel oil, and residual fuel oil.<sup>4</sup>Includes commercial sector consumption of wood and wood waste, landfill gas, municipal waste, and other biomass for combined heat and power. Excludes nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.<sup>5</sup>Includes combined heat and power plants that have a non-regulatory status, and small on-site generating systems.<sup>6</sup>Includes motor gasoline (including ethanol and ethers), residual fuel oil, petroleum coke, asphalt, road oil, lubricants, still gas, and miscellaneous petroleum products.<sup>7</sup>Includes consumption of energy produced from hydroelectric, wood and wood waste, municipal waste, and other biomass sources. Excludes ethanol.<sup>8</sup>Includes propane, motor gasoline, ethanol and ethers, jet fuel, distillate fuel oil, residual fuel oil, aviation gasoline, and lubricants.<sup>9</sup>Represents consumption unattributed to the sectors above.<sup>10</sup>Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.<sup>11</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>12</sup>Includes conventional hydroelectric, geothermal, wood and wood waste, biogenic municipal waste, other biomass, wind, photovoltaic, and solar thermal sources.<sup>13</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.<sup>14</sup>Includes non-biogenic municipal waste, liquid hydrogen, and net electricity imports.<sup>15</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 2012, international bunker fuels accounted for 90 to 126 million metric tons annually.<sup>16</sup>Includes emissions from geothermal power and emissions from non-biogenic municipal waste.<sup>17</sup>Cumulative after December 31, 2015.

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.

Source: 2015: U.S. Energy Information Administration, (EIA), *Short-Term Energy Outlook*, February 2016 and EIA, AEO2016 National Energy Modeling System run ref2016.d032416a. Projections: EIA, AEO2016 National Energy Modeling System, runs ref2016.d032416a, and extended.d051216a.

**Table D4. Natural gas supply and disposition, oil and gas resource and technology cases**  
(trillion cubic feet per year, unless otherwise noted)

Supply, disposition, and prices	2015	2020			2030			2040		
		Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology	Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology	Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology
<b>Henry Hub spot price</b>										
(2015 dollars per million Btu) .....	2.62	6.27	4.43	2.89	7.61	5.06	3.50	9.17	4.86	2.43
(nominal dollars per million Btu).....	2.62	6.97	4.90	3.18	10.60	6.84	4.64	16.15	8.17	3.95
<b>Dry gas production<sup>1</sup></b> .....	<b>27.19</b>	<b>27.35</b>	<b>30.50</b>	<b>34.19</b>	<b>25.50</b>	<b>37.76</b>	<b>47.14</b>	<b>26.68</b>	<b>42.12</b>	<b>55.53</b>
Lower 48 onshore .....	25.20	25.82	28.82	32.41	24.29	36.15	45.44	24.30	40.18	53.35
Tight gas .....	5.00	4.81	4.92	5.11	4.37	6.08	7.02	4.50	6.55	8.00
Shale gas and tight oil plays <sup>2</sup> .....	13.64	14.91	17.96	21.57	14.84	25.16	33.66	15.03	29.00	41.02
Coalbed methane .....	1.24	1.18	1.04	0.96	1.10	0.94	0.82	0.97	0.78	0.63
Other.....	5.32	4.92	4.90	4.78	3.98	3.97	3.95	3.80	3.85	3.70
Lower 48 offshore .....	1.70	1.23	1.39	1.48	0.93	1.33	1.39	1.15	1.67	1.84
Alaska .....	0.29	0.29	0.29	0.29	0.28	0.28	0.31	1.23	0.28	0.34
Supplemental natural gas <sup>3</sup> .....	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
<b>Net imports</b> .....	<b>0.95</b>	<b>-2.37</b>	<b>-2.89</b>	<b>-3.22</b>	<b>-1.59</b>	<b>-6.02</b>	<b>-10.21</b>	<b>-1.90</b>	<b>-7.55</b>	<b>-13.00</b>
Pipeline <sup>4</sup> .....	0.89	-0.14	-0.48	-0.80	0.25	-0.97	-2.02	1.62	-0.89	-2.81
Liquefied natural gas.....	0.06	-2.22	-2.42	-2.42	-1.84	-5.06	-8.19	-3.52	-6.66	-10.19
<b>Total supply</b> .....	<b>28.20</b>	<b>25.04</b>	<b>27.67</b>	<b>31.03</b>	<b>23.98</b>	<b>31.80</b>	<b>36.99</b>	<b>24.84</b>	<b>34.63</b>	<b>42.59</b>
<b>Consumption by sector</b>										
Residential .....	4.62	4.62	4.71	4.80	4.44	4.65	4.79	4.30	4.58	4.76
Commercial.....	3.22	3.20	3.34	3.47	3.14	3.42	3.65	3.23	3.69	4.02
Industrial <sup>5</sup> .....	7.51	8.14	8.29	8.33	8.62	8.85	9.12	9.26	9.58	9.89
Electric power <sup>6</sup> .....	9.61	6.29	8.26	11.10	5.12	11.02	14.60	4.76	11.96	17.94
Transportation <sup>7</sup> .....	0.06	0.09	0.09	0.09	0.16	0.22	0.23	0.47	0.66	0.52
Pipeline fuel .....	0.86	0.75	0.81	0.90	0.68	0.91	1.10	0.74	1.04	1.28
Lease and plant fuel <sup>8</sup> .....	1.58	1.57	1.71	1.88	1.46	2.00	2.47	1.51	2.24	2.94
Liquefaction for export <sup>9</sup> .....	0.00	0.23	0.25	0.25	0.19	0.51	0.83	0.36	0.67	1.03
<b>Total</b> .....	<b>27.47</b>	<b>24.89</b>	<b>27.46</b>	<b>30.83</b>	<b>23.81</b>	<b>31.59</b>	<b>36.78</b>	<b>24.64</b>	<b>34.42</b>	<b>42.38</b>
Discrepancy <sup>10</sup> .....	0.73	0.16	0.21	0.21	0.17	0.21	0.21	0.20	0.21	0.21

<sup>1</sup>Marketed production (wet) minus extraction losses.

<sup>2</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>3</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>4</sup>Natural gas imported from Canada and Mexico.

<sup>5</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>6</sup>Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.

<sup>7</sup>Natural gas used as fuel in motor vehicles, trains, and ships.

<sup>8</sup>Represents natural gas used in well, field, and lease operations, and in natural gas processing plant machinery.

<sup>9</sup>Fuel used in facilities that liquefy natural gas for export.

<sup>10</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.

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), *Short-Term Energy Outlook*, February 2016 and EIA, AEO2016 National Energy Modeling System run ref2016.d032416a. Projections: EIA, AEO2016 National Energy Modeling System runs lowresource.d032516a, ref2016.d032416a, and highresource.d032516a.

**Table D5. Liquid fuels supply and disposition, oil and gas resource and technology cases**  
(million barrels per day, unless otherwise noted)

Supply, disposition, and prices	2015	2020			2030			2040		
		Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology	Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology	Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology
<b>Crude oil prices</b>										
<b>(2015 dollars per barrel)</b>										
Brent spot .....	52	79	77	71	112	104	85	152	136	110
West Texas Intermediate spot .....	49	74	71	65	106	97	77	147	129	99
Imported crude oil <sup>1</sup> .....	46	71	69	63	101	95	76	139	126	95
<b>Crude oil supply</b>										
Domestic production <sup>2</sup> .....	9.42	8.08	9.38	11.25	7.55	10.06	13.89	7.02	11.26	17.68
Alaska .....	0.48	0.41	0.41	0.41	0.24	0.24	0.44	0.15	0.15	0.67
Lower 48 States .....	8.94	7.66	8.96	10.83	7.31	9.82	13.46	6.87	11.11	17.01
Net imports .....	6.88	7.19	6.97	6.48	6.92	6.57	4.15	6.81	6.10	-0.02
Gross imports .....	7.28	7.82	7.60	7.11	7.56	7.20	6.02	7.68	7.12	6.17
Exports .....	0.40	0.63	0.63	0.63	0.63	0.63	1.87	0.86	1.02	6.18
Other crude oil supply <sup>3</sup> .....	-0.11	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total crude oil supply</b> .....	<b>16.19</b>	<b>15.28</b>	<b>16.36</b>	<b>17.74</b>	<b>14.47</b>	<b>16.63</b>	<b>18.04</b>	<b>13.83</b>	<b>17.36</b>	<b>17.67</b>
Net product imports .....	-2.24	-1.61	-3.26	-5.25	-0.71	-4.32	-6.26	0.54	-4.66	-5.59
Gross refined product imports <sup>4</sup> .....	0.66	1.18	1.11	1.07	1.46	1.30	1.11	1.96	1.63	1.27
Unfinished oil imports .....	0.55	0.53	0.53	0.54	0.46	0.46	0.46	0.39	0.39	0.39
Blending component imports .....	0.67	0.58	0.58	0.61	0.44	0.45	0.44	0.29	0.30	0.28
Exports .....	4.12	3.91	5.48	7.46	3.07	6.52	8.27	2.11	6.98	7.52
Refinery processing gain <sup>5</sup> .....	1.03	1.05	1.05	1.11	0.94	0.98	0.99	0.93	0.99	0.91
Natural gas plant liquids .....	3.25	4.01	4.57	5.09	3.45	4.90	5.72	3.21	4.99	6.24
Supply from renewable sources .....	1.01	1.08	1.08	1.08	1.03	1.03	1.02	1.12	1.12	1.10
Ethanol .....	0.89	0.89	0.89	0.89	0.84	0.84	0.84	0.92	0.93	0.91
Domestic production .....	0.94	0.89	0.90	0.90	0.87	0.87	0.87	0.89	0.91	0.92
Net imports .....	-0.05	0.00	-0.01	-0.01	-0.03	-0.03	-0.04	0.04	0.02	-0.01
Biodiesel .....	0.11	0.15	0.15	0.15	0.12	0.10	0.05	0.12	0.10	0.05
Domestic production .....	0.08	0.12	0.11	0.11	0.08	0.06	0.01	0.08	0.06	0.01
Net imports .....	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Other biomass-derived liquids <sup>6</sup> .....	0.00	0.04	0.04	0.04	0.08	0.09	0.14	0.08	0.09	0.14
Other <sup>7</sup> .....	0.21	0.28	0.28	0.27	0.29	0.30	0.29	0.30	0.32	0.30
<b>Total primary supply</b> <sup>8</sup> .....	<b>19.46</b>	<b>20.08</b>	<b>20.08</b>	<b>20.03</b>	<b>19.46</b>	<b>19.52</b>	<b>19.80</b>	<b>19.93</b>	<b>20.12</b>	<b>20.63</b>
Net import share of product supplied .....	23.7	28.0	18.6	6.2	32.0	11.6	-10.7	37.3	7.4	-27.0
Net expenditures for imports of crude oil & petroleum products (billion 2015 dollars)....	128	220	207	179	300	268	182	412	348	231
<b>Refined petroleum product prices to the transportation sector</b>										
<b>(2015 dollars per gallon)</b>										
Propane .....	1.64	1.97	1.94	1.88	2.20	2.14	2.04	2.54	2.43	2.32
Ethanol (E85) <sup>9</sup> .....	2.21	3.09	3.05	2.96	3.02	2.93	2.71	3.45	3.33	3.01
Ethanol wholesale price .....	2.22	2.80	2.77	2.72	2.33	2.28	2.28	2.64	2.60	2.48
Motor gasoline <sup>10</sup> .....	2.52	2.81	2.74	2.64	3.37	3.19	2.78	4.10	3.81	3.13
Jet fuel <sup>11</sup> .....	1.62	2.26	2.18	2.05	3.08	2.87	2.44	4.09	3.74	2.91
Distillate fuel oil <sup>12</sup> .....	2.72	3.24	3.18	3.05	4.03	3.85	3.42	5.01	4.68	3.87
Residual fuel oil .....	1.21	1.77	1.75	1.64	2.40	2.25	1.80	3.13	2.87	2.14

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

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

<sup>3</sup>Strategic petroleum reserve stock additions plus unaccounted for crude oil and crude stock withdrawals minus crude product supplied.

<sup>4</sup>Includes other hydrocarbons and alcohol.

<sup>5</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>6</sup>Includes pyrolysis oils, biomass-derived Fischer-Tropsch liquids, biobutanol, and renewable feedstocks used for the on-site production of diesel and gasoline.

<sup>7</sup>Includes domestic sources of other blending components, other hydrocarbons, and ethers.

<sup>8</sup>Total crude supply, net product imports, refinery processing gain, natural gas plant liquids, supply from renewable sources, and other supply.

<sup>9</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 this forecast.

<sup>10</sup>Sales weighted-average price for all grades. Includes Federal, State, and local taxes.

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

<sup>12</sup>Diesel fuel for on-road use. Includes Federal and State taxes while excluding county and local taxes.

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), *Short-Term Energy Outlook*, February 2016 and EIA, AEO2016 National Energy Modeling System run ref2016.d032416a. Projections: EIA, AEO2016 National Energy Modeling System runs lowresource.d032516a, ref2016.d032416a, and highresource.d032516a.

**Table D6. Key transportation results, oil and gas resource and technology cases**

Key indicators and consumption	2015	2020			2030			2040		
		Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology	Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology	Low Oil and Gas Resource and Technology	Reference	High Oil and Gas Resource and Technology
<b>Level of travel</b>										
(billion vehicle miles traveled)										
Light-duty vehicles less than 8,501 lbs	2,752	3,019	3,031	3,043	3,191	3,232	3,332	3,364	3,438	3,656
Commercial light trucks <sup>1</sup> .....	96	110	110	109	124	125	127	140	143	146
Freight trucks greater than 10,000 lbs .	280	303	304	304	343	349	356	395	407	417
(billion seat miles available)										
Air .....	1,070	1,166	1,168	1,170	1,360	1,364	1,373	1,529	1,531	1,536
(billion ton miles traveled)										
Rail .....	1,690	1,805	1,810	1,811	1,983	2,006	2,037	2,085	2,128	2,171
Domestic shipping .....	482	448	453	455	387	404	420	378	407	431
<b>Energy efficiency indicators</b>										
<b>(miles per gallon)</b>										
Tested new light-duty vehicle <sup>2</sup> .....	30.9	37.0	36.9	36.8	47.5	47.2	46.7	48.1	47.8	47.1
New car <sup>2</sup> .....	35.9	44.2	44.2	44.2	55.2	55.1	54.9	55.3	55.1	54.9
New light truck <sup>2</sup> .....	27.0	31.8	31.7	31.7	40.5	40.4	40.3	40.5	40.4	40.4
On-road new light-duty vehicle <sup>3</sup> .....	25.0	29.9	29.8	29.7	38.4	38.2	37.7	38.9	38.6	38.0
New car <sup>3</sup> .....	29.3	36.1	36.1	36.1	45.1	45.0	44.9	45.1	45.0	44.8
New light truck <sup>3</sup> .....	21.6	25.4	25.4	25.4	32.4	32.3	32.3	32.4	32.3	32.3
Light-duty stock <sup>4</sup> .....	21.7	24.1	24.1	24.1	31.5	31.5	31.4	36.5	36.3	36.0
New commercial light truck <sup>1</sup> .....	17.3	19.6	19.5	19.5	24.0	24.0	23.9	24.1	24.0	24.0
Stock commercial light truck <sup>1</sup> .....	15.0	16.6	16.6	16.6	20.8	20.8	20.9	23.2	23.2	23.2
Freight truck .....	6.9	7.3	7.3	7.3	7.8	7.8	7.8	8.0	8.0	7.9
<b>Energy use by mode (quadrillion Btu)</b>										
Light-duty vehicles .....	15.86	15.66	15.73	15.80	12.63	12.82	13.26	11.52	11.83	12.71
Commercial light trucks <sup>1</sup> .....	0.80	0.82	0.82	0.82	0.74	0.75	0.76	0.76	0.77	0.79
Bus transportation .....	0.26	0.27	0.27	0.27	0.29	0.29	0.29	0.31	0.31	0.31
Freight trucks .....	5.57	5.74	5.76	5.75	6.06	6.16	6.30	6.77	6.98	7.20
Rail, passenger .....	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06
Rail, freight .....	0.48	0.50	0.50	0.50	0.51	0.51	0.52	0.50	0.51	0.52
Shipping, domestic and international ....	0.83	0.73	0.73	0.73	0.74	0.77	0.84	0.77	0.82	0.89
Air.....	2.37	2.51	2.52	2.52	2.81	2.82	2.84	2.99	3.00	3.01
Other uses <sup>4</sup> .....	1.03	1.06	1.06	1.06	1.11	1.12	1.12	1.22	1.22	1.24
Pipeline fuel.....	0.89	0.77	0.83	0.93	0.71	0.94	1.13	0.76	1.07	1.32
<b>Total .....</b>	<b>28.14</b>	<b>28.12</b>	<b>28.28</b>	<b>28.44</b>	<b>25.66</b>	<b>26.24</b>	<b>27.12</b>	<b>25.65</b>	<b>26.57</b>	<b>28.04</b>
<b>Energy use by fuel (quadrillion Btu)</b>										
Propane .....	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
Motor gasoline <sup>5</sup> .....	17.01	16.72	16.79	16.85	13.41	13.62	14.07	12.20	12.55	13.44
of which: E85 <sup>6</sup> .....	0.05	0.04	0.04	0.03	0.24	0.22	0.16	0.32	0.28	0.20
Jet fuel <sup>7</sup> .....	2.84	2.99	2.99	3.00	3.31	3.32	3.34	3.55	3.56	3.57
Distillate fuel oil <sup>8</sup> .....	6.67	6.97	6.99	6.99	7.44	7.49	7.65	7.97	8.01	8.41
Residual fuel oil .....	0.45	0.37	0.37	0.37	0.39	0.42	0.47	0.42	0.45	0.52
Other petroleum <sup>9</sup> .....	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Liquid fuels and other petroleum.....	27.14	27.22	27.32	27.38	24.73	25.01	25.70	24.32	24.75	26.13
Pipeline fuel natural gas.....	0.89	0.77	0.83	0.93	0.71	0.94	1.13	0.76	1.07	1.32
Compressed/liquefied natural gas.....	0.07	0.08	0.08	0.09	0.10	0.17	0.18	0.40	0.59	0.44
Liquid hydrogen.....	0.00	0.01	0.01	0.01	0.04	0.04	0.04	0.06	0.06	0.06
Electricity .....	0.03	0.05	0.05	0.05	0.11	0.11	0.11	0.15	0.15	0.16
<b>Delivered energy use .....</b>	<b>28.13</b>	<b>28.13</b>	<b>28.29</b>	<b>28.45</b>	<b>25.69</b>	<b>26.28</b>	<b>27.17</b>	<b>25.70</b>	<b>26.63</b>	<b>28.12</b>

<sup>1</sup>Commercial trucks 8,501 to 10,000 pounds gross vehicle weight rating.<sup>2</sup>Tested new vehicle efficiency revised for on-road performance.<sup>3</sup>Combined "on-the-road" estimate for all cars and light trucks.<sup>4</sup>Includes recreational boats, military use, and lubricants.<sup>5</sup>Includes ethanol and ethers blended into gasoline.<sup>6</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 this forecast.<sup>7</sup>Includes only kerosene type.<sup>8</sup>Diesel fuel for on- and off- road use.<sup>9</sup>Includes aviation gasoline and lubricants.

Lbs = Pounds.

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.

Source: 2015: U.S. Energy Information Administration, (EIA), *Short-Term Energy Outlook*, February 2016 and EIA, AEO2016 National Energy Modeling System run ref2016.d032416a. Projections: EIA, AEO2016 National Energy Modeling System runs lowresource.d032516a, ref2016.d032416a, and highresource.d032516a.

**Table D7. Key results for industrial energy efficiency cases**  
(quadrillion Btu per year, unless otherwise noted)

Consumption and emissions	2015	2025				2040			
		Reference	Energy Efficiency	Low Incentive	High Incentive	Reference	Energy Efficiency	Low Incentive	High Incentive
Energy consumption									
Industrial <sup>1</sup>									
Cement and lime									
Petroleum and other liquids.....	0.04	0.09	0.10	0.09	0.09	0.14	0.13	0.14	0.14
Natural gas.....	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Coal.....	0.14	0.17	0.15	0.17	0.17	0.19	0.16	0.19	0.19
Renewable energy <sup>2</sup> .....	0.09	0.13	0.12	0.13	0.13	0.16	0.14	0.16	0.16
Electricity.....	0.05	0.06	0.05	0.06	0.06	0.07	0.06	0.07	0.07
Total cement and lime .....	0.33	0.47	0.43	0.47	0.45	0.58	0.51	0.57	0.57
Aluminum									
Petroleum and other liquids.....	0.03	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.03
Natural gas.....	0.11	0.13	0.11	0.14	0.15	0.13	0.11	0.14	0.14
Electricity.....	0.20	0.23	0.20	0.23	0.22	0.21	0.19	0.21	0.20
Total aluminum .....	0.34	0.42	0.38	0.42	0.42	0.40	0.36	0.40	0.37
Glass									
Petroleum and other liquids.....	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Natural gas.....	0.17	0.19	0.19	0.19	0.18	0.19	0.16	0.17	0.16
Electricity.....	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
Total glass.....	0.24	0.27	0.26	0.27	0.26	0.27	0.24	0.25	0.23
Iron and steel									
Petroleum and other liquids.....	0.07	0.10	0.09	0.09	0.08	0.13	0.13	0.13	0.14
Natural gas.....	0.40	0.43	0.37	0.42	0.39	0.45	0.40	0.48	0.49
Coal.....	0.56	0.50	0.47	0.45	0.33	0.47	0.44	0.43	0.41
Electricity.....	0.18	0.23	0.23	0.23	0.20	0.29	0.29	0.30	0.30
Total iron and steel.....	1.21	1.26	1.17	1.20	1.00	1.34	1.25	1.34	1.34
Paper									
Petroleum and other liquids.....	0.03	0.04	0.03	0.04	0.03	0.04	0.03	0.04	0.04
Natural gas.....	0.39	0.37	0.30	0.37	0.36	0.37	0.30	0.38	0.37
Coal.....	0.20	0.21	0.18	0.21	0.20	0.24	0.21	0.25	0.24
Renewable energy <sup>2</sup> .....	0.99	0.99	0.99	0.98	0.96	1.07	1.08	1.08	1.07
Electricity.....	0.20	0.18	0.14	0.17	0.16	0.15	0.13	0.14	0.13
Total paper .....	1.81	1.79	1.64	1.77	1.71	1.87	1.75	1.88	1.84
Other industries									
Petroleum and other liquids.....	7.86	9.87	9.86	9.73	9.38	11.42	11.41	11.10	10.77
Natural gas.....	8.30	10.20	10.22	10.14	9.85	11.73	11.75	11.57	11.40
Coal.....	0.44	0.43	0.43	0.43	0.42	0.45	0.45	0.44	0.44
Renewable energy <sup>2</sup> .....	1.18	1.27	1.27	1.26	1.25	1.39	1.39	1.37	1.37
Electricity.....	2.62	3.17	3.17	3.11	2.97	3.51	3.50	3.40	3.28
Total other industries .....	20.40	24.94	24.95	24.67	23.87	28.49	28.50	27.89	27.27
Total industrial sector									
Petroleum and other liquids.....	8.07	10.19	10.19	10.05	9.68	11.82	11.80	11.51	11.16
Natural gas.....	9.38	11.34	11.21	11.28	10.94	12.89	12.74	12.75	12.58
Coal.....	1.34	1.31	1.23	1.26	1.12	1.34	1.26	1.31	1.28
Renewable energy <sup>2</sup> .....	2.26	2.39	2.38	2.38	2.33	2.63	2.61	2.62	2.60
Electricity.....	3.27	3.91	3.83	3.83	3.65	4.26	4.21	4.15	4.01
Total industrial sector .....	24.33	29.14	28.83	28.80	27.71	32.94	32.62	32.34	31.63
Total delivered energy consumption									
Petroleum and other liquids.....	36.23	37.18	37.19	36.84	35.99	37.44	37.42	36.67	35.70
Natural gas.....	18.43	20.61	20.48	20.47	19.91	23.09	22.95	22.77	22.26
Coal.....	1.40	1.36	1.28	1.31	1.17	1.39	1.31	1.36	1.34
Renewable energy <sup>3</sup> .....	2.84	2.94	2.92	2.93	2.90	3.13	3.11	3.13	3.13
Electricity.....	12.72	13.60	13.53	13.37	12.95	15.23	15.19	14.82	14.38
Total.....	71.62	75.73	75.44	74.94	72.95	80.34	80.04	78.81	76.87
Electricity related losses.....	25.12	25.83	25.70	24.94	22.61	26.81	26.80	25.08	24.92
Total energy consumption.....	96.74	101.56	101.14	99.89	95.56	107.15	106.84	103.88	101.79

**Table D7. Key results for industrial energy efficiency cases (*continued*)**  
(quadrillion Btu per year, unless otherwise noted)

Consumption and emissions	2015	2025				2040			
		Reference	Energy Efficiency	Low Incentive	High Incentive	Reference	Energy Efficiency	Low Incentive	High Incentive
Carbon dioxide emissions <sup>4</sup> (million metric tons)									
Residential.....	1,028	895	895	817	617	821	825	642	477
Commercial .....	918	836	837	756	550	826	830	632	450
Industrial <sup>1</sup> .....	1,472	1,600	1,575	1,523	1,316	1,660	1,637	1,498	1,341
Cement and lime .....	24	32	30	31	28	38	33	35	34
Aluminum .....	40	42	38	40	30	35	32	29	19
Glass .....	16	17	17	17	15	17	15	15	12
Iron and steel.....	108	106	101	98	72	107	101	97	88
Paper.....	72	65	53	62	52	60	52	56	51
Other industries .....	1,212	1,337	1,337	1,276	1,120	1,403	1,404	1,266	1,138
Transportation .....	1,855	1,784	1,785	1,770	1,735	1,737	1,737	1,703	1,657
Total carbon dioxide emissions .....	5,273	5,115	5,092	4,865	4,217	5,044	5,029	4,475	3,925

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

<sup>3</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>4</sup>Emissions from the electric power sector are distributed to the end-use sectors.

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.

Source: 2015: U.S. Energy Information Administration, (EIA), *Short-Term Energy Outlook*, February 2016 and EIA, AEO2016 National Energy Modeling System run ref2016.d032416a. Projections: EIA, AEO2016 National Energy Modeling System, runs ref2016.d032416a, efficienttech.d032516a, lowinnovate.d032516a, and highinnovate.D032516a.