

Appendix A

Reference case projections

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Table A1. World total primary energy consumption by region, Reference case, 2015-50

quadrillion Btu

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	121.9	124.4	125.5	124.8	126.3	129.5	133.0	136.9	0.3
United States /a	97.5	100.2	100.7	99.1	99.5	101.6	104.1	106.9	0.3
Canada	15.1	15.1	15.3	15.5	15.9	16.2	16.7	17.1	0.4
Mexico and Chile	9.3	9.1	9.5	10.2	10.9	11.6	12.2	12.9	0.9
OECD Europe	79.8	80.5	81.0	83.0	84.8	87.2	88.8	91.4	0.4
OECD Asia	38.3	39.1	41.3	42.5	43.7	45.1	46.5	48.3	0.7
Japan	19.6	19.2	19.7	19.4	19.1	18.8	18.5	18.3	-0.2
South Korea	11.7	12.8	13.8	14.7	15.5	16.4	17.2	18.1	1.3
Australia and New Zealand	6.9	7.2	7.8	8.4	9.1	9.9	10.8	11.9	1.6
Total OECD	239.9	244.0	247.8	250.3	254.8	261.8	268.3	276.6	0.4
Non-OECD									
Non-OECD Europe and Eurasia	47.7	47.5	47.4	47.6	48.4	48.7	48.6	48.7	0.1
Russia	30.2	29.8	29.8	30.0	30.4	30.3	29.8	29.2	-0.1
Other	17.5	17.7	17.6	17.7	18.0	18.4	18.8	19.5	0.3
Non-OECD Asia	200.1	221.8	241.8	260.3	280.0	302.3	324.5	344.6	1.6
China	133.1	146.4	155.9	161.2	166.8	172.5	177.9	181.6	0.9
India	28.4	33.3	38.0	44.3	51.9	60.7	69.2	76.5	2.9
Other	38.6	42.2	47.9	54.8	61.3	69.1	77.4	86.4	2.3
Middle East	33.9	36.4	39.0	41.8	45.4	49.3	53.5	57.2	1.5
Africa	22.7	24.2	25.5	27.9	31.0	34.2	37.5	41.1	1.7
Non-OECD Americas	31.1	31.0	33.4	35.4	37.6	40.2	42.8	45.6	1.1
Brazil	14.9	14.8	16.5	17.5	18.5	19.7	20.9	22.0	1.1
Other	16.2	16.2	17.0	17.9	19.1	20.4	22.0	23.6	1.1
Total Non-OECD	335.5	360.9	387.1	413.0	442.4	474.7	506.9	537.1	1.4
Total World	575.4	604.9	634.9	663.2	697.3	736.5	775.2	813.7	1.0

a/ Includes the 50 states and the District of Columbia.

Notes: Energy totals include net imports of coal coke and electricity generated from biomass in the United States.

Totals may not equal sum of components due to independent rounding.

The electricity portion of the national fuel consumption values consists of generation for domestic use plus an adjustment for electricity trade based on a fuel's share of total generation in the exporting country.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a.

Table A2. World total energy consumption by region, Reference case, 2015-50

quadrillion Btu

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas									
Liquids	46.3	47.2	46.4	45.1	45.0	45.8	47.1	48.7	0.1
Natural gas	35.2	35.5	37.2	38.9	40.5	42.5	44.5	46.7	0.8
Coal	16.8	16.5	14.7	12.6	12.0	11.5	11.2	10.8	-1.2
Nuclear	9.5	9.1	9.0	9.1	8.7	8.2	7.6	6.9	-0.9
Other	14.0	16.1	18.1	19.0	20.2	21.4	22.7	23.8	1.5
Total	121.9	124.4	125.5	124.8	126.3	129.5	133.0	136.9	0.3
OECD Europe									
Liquids	28.6	28.4	27.2	26.8	26.6	26.4	26.0	25.8	-0.3
Natural gas	17.3	17.8	18.0	18.6	20.9	22.8	25.1	27.8	1.4
Coal	11.8	12.3	11.9	11.7	11.7	11.6	11.7	12.1	0.1
Nuclear	8.5	7.4	6.7	6.8	6.3	6.0	5.0	4.0	-2.1
Other	13.6	14.5	17.2	19.2	19.4	20.4	20.9	21.7	1.3
Total	79.8	80.5	81.0	83.0	84.8	87.2	88.8	91.4	0.4
OECD Asia									
Liquids	15.8	15.1	15.1	15.2	15.3	15.4	15.6	15.8	0.0
Natural gas	8.6	8.7	9.0	9.6	10.2	10.9	11.6	12.4	1.0
Coal	9.1	9.0	9.1	9.1	9.1	9.2	9.3	9.5	0.1
Nuclear	1.5	3.0	3.7	3.7	3.9	4.0	4.1	4.3	3.0
Other	3.2	3.3	4.4	5.0	5.3	5.6	6.0	6.4	2.0
Total	38.3	39.1	41.3	42.5	43.7	45.1	46.5	48.3	0.7
Total OECD									
Liquids	90.8	90.8	88.6	87.0	86.8	87.7	88.6	90.4	0.0
Natural gas	61.1	62.1	64.2	67.1	71.5	76.2	81.2	86.8	1.0
Coal	37.7	37.9	35.8	33.4	32.8	32.3	32.2	32.4	-0.4
Nuclear	19.5	19.4	19.5	19.6	18.8	18.2	16.7	15.2	-0.7
Other	30.7	33.8	39.7	43.2	44.9	47.4	49.6	51.9	1.5
Total	239.9	244.0	247.8	250.3	254.8	261.8	268.3	276.6	0.4
Non-OECD									
Non-OECD Europe and Eurasia									
Liquids	11.4	11.4	11.0	10.8	10.9	10.8	10.6	10.5	-0.3
Natural gas	21.6	21.1	21.1	21.3	21.9	22.1	22.1	22.2	0.1
Coal	8.2	7.8	7.6	7.5	7.7	7.6	7.5	7.3	-0.3
Nuclear	3.2	3.9	4.4	4.3	4.2	4.1	4.1	4.2	0.8
Other	3.3	3.3	3.3	3.7	3.8	4.0	4.2	4.5	0.9
Total	47.7	47.5	47.4	47.6	48.4	48.7	48.6	48.7	0.1
Non-OECD Asia									
Liquids	49.1	55.8	62.1	67.5	72.9	78.6	83.7	87.4	1.7
Natural gas	18.5	20.8	26.5	31.2	37.8	44.9	52.7	60.5	3.4
Coal	106.9	110.1	111.8	111.0	111.7	113.0	114.7	116.2	0.2
Nuclear	2.9	4.3	5.9	8.2	10.8	13.8	16.1	18.0	5.4
Other	22.8	30.8	35.4	42.5	46.9	52.0	57.3	62.4	2.9
Total	200.1	221.8	241.8	260.3	280.0	302.3	324.5	344.6	1.6

Table A2. World total energy consumption by region, Reference case, 2015-50 (cont.)

quadrillion Btu

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
Middle East									
Liquids	17.2	19.1	18.7	18.2	19.2	20.4	21.8	22.8	0.8
Natural gas	16.4	16.4	18.9	21.7	23.8	25.9	28.5	30.8	1.8
Coal	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.5	5.3
Nuclear	0.0	0.5	0.6	0.8	1.0	1.2	1.2	1.3	10.6
Other	0.2	0.2	0.7	0.9	1.2	1.5	1.6	1.8	6.1
Total	33.9	36.4	39.0	41.8	45.4	49.3	53.5	57.2	1.5
Africa									
Liquids	8.4	9.0	8.9	9.5	10.5	11.7	13.2	15.0	1.7
Natural gas	5.2	5.6	6.3	6.4	6.7	7.3	7.9	8.6	1.4
Coal	4.3	4.9	5.4	5.5	5.6	5.9	6.2	6.6	1.2
Nuclear	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.4	3.2
Other	4.6	4.6	4.7	6.2	8.0	9.0	9.7	10.4	2.3
Total	22.7	24.2	25.5	27.9	31.0	34.2	37.5	41.1	1.7
Non-OECD Americas									
Liquids	13.7	13.8	14.6	15.2	15.8	16.7	17.7	18.7	0.9
Natural gas	6.0	5.8	6.3	6.6	7.0	7.7	8.5	9.3	1.2
Coal	1.1	1.1	1.1	1.2	1.2	1.3	1.5	1.6	1.1
Nuclear	0.2	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.9
Other	10.1	10.0	11.0	12.0	13.2	14.0	14.9	15.7	1.3
Total	31.1	31.0	33.4	35.4	37.6	40.2	42.8	45.6	1.1
Total Non-OECD									
Liquids	99.7	109.2	115.3	121.1	129.2	138.3	147.1	154.5	1.3
Natural gas	67.8	69.7	79.2	87.2	97.1	107.9	119.6	131.3	1.9
Coal	120.5	124.1	126.1	125.5	126.5	128.2	130.3	132.2	0.3
Nuclear	6.5	9.1	11.4	13.9	16.6	19.7	22.0	24.2	3.8
Other	41.0	48.9	55.1	65.3	73.1	80.6	87.8	94.8	2.4
Total	335.5	360.9	387.1	413.0	442.4	474.7	506.9	537.1	1.4
Total World									
Liquids	190.6	200.0	203.9	208.1	216.0	226.0	235.8	244.9	0.7
Natural gas	128.9	131.7	143.4	154.3	168.6	184.0	200.9	218.2	1.5
Coal	158.2	161.9	161.9	158.8	159.3	160.5	162.5	164.6	0.1
Nuclear	26.0	28.5	30.9	33.5	35.4	37.9	38.7	39.4	1.2
Other	71.7	82.7	94.8	108.4	117.9	128.0	137.3	146.6	2.1
Total	575.4	604.9	634.9	663.2	697.3	736.5	775.2	813.7	1.0

Notes: Energy totals include net imports of coal coke and electricity generated from biomass in the United States.

Totals may not equal sum of components due to independent rounding.

The electricity portion of the national fuel consumption values consists of generation for domestic use plus an adjustment for electricity trade based on a fuel's share of total generation in the exporting country.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A3. World gross domestic product (GDP) by region expressed in purchasing power parity, Reference case, 2015-50

billion 2010 dollars

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	20,351	22,580	25,429	27,990	31,014	34,346	37,789	41,184	2.0
United States /a	16,397	18,236	20,558	22,585	25,054	27,852	30,782	33,653	2.1
Canada	1,506	1,635	1,783	1,920	2,055	2,179	2,289	2,385	1.3
Mexico and Chile	2,447	2,709	3,087	3,484	3,905	4,316	4,719	5,146	2.1
OECD Europe	19,784	21,405	23,126	24,738	26,350	27,975	29,557	31,429	1.3
OECD Asia	7,447	7,997	8,582	9,028	9,453	9,856	10,337	10,908	1.1
Japan	4,535	4,694	4,844	4,860	4,854	4,792	4,752	4,752	0.1
South Korea	1,705	1,929	2,177	2,399	2,587	2,782	3,003	3,238	1.8
Australia and New Zealand	1,207	1,374	1,561	1,770	2,011	2,282	2,582	2,918	2.6
Total OECD	47,582	51,982	57,136	61,756	66,818	72,177	77,683	83,520	1.6
Non-OECD									
Non-OECD Europe and Eurasia	5,531	6,045	6,581	7,197	7,966	8,653	9,254	9,817	1.7
Russia	3,433	3,682	3,897	4,189	4,581	4,864	5,048	5,146	1.2
Other	2,098	2,363	2,685	3,008	3,385	3,789	4,206	4,671	2.3
Non-OECD Asia	34,985	46,067	58,490	71,920	86,329	101,557	117,004	131,339	3.9
China	18,160	24,063	30,470	37,365	44,549	51,809	59,024	65,243	3.7
India	7,324	10,267	13,451	16,914	20,738	24,867	28,920	32,396	4.3
Other	9,501	11,737	14,569	17,642	21,042	24,881	29,061	33,700	3.7
Middle East	4,749	5,694	6,697	7,790	8,947	10,062	11,247	12,249	2.7
Africa	5,495	6,424	7,850	9,559	11,670	14,250	17,350	21,062	3.9
Non-OECD Americas	6,351	6,910	7,972	8,860	9,792	10,807	11,878	12,966	2.1
Brazil	2,963	3,134	3,560	3,840	4,112	4,402	4,677	4,932	1.5
Other	3,388	3,776	4,412	5,020	5,679	6,406	7,201	8,034	2.5
Total Non-OECD	57,110	71,140	87,591	105,327	124,704	145,328	166,734	187,434	3.5
Total World	104,692	123,122	144,727	167,083	191,521	217,506	244,417	270,954	2.8

a/ Includes the 50 states and the District of Columbia.

Notes: Totals may not equal sum of components due to independent rounding.

Sources: derived from Oxford Economic Model (March 2017), www.oxfordeconomics.com (subscription site) and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A4. World gross domestic product (GDP) by region expressed in market exchange rates, Reference case, 2015-50

billion 2010 dollars

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	19,667	21,817	24,544	26,973	29,855	33,047	36,350	39,592	2.0
United States /a	16,397	18,236	20,558	22,585	25,054	27,852	30,782	33,653	2.1
Canada	1,797	1,950	2,127	2,290	2,450	2,598	2,730	2,845	1.3
Mexico and Chile	1,474	1,631	1,859	2,098	2,351	2,597	2,839	3,095	2.1
OECD Europe	19,964	21,529	23,172	24,679	26,171	27,687	29,187	30,950	1.3
OECD Asia	8,845	9,441	10,070	10,532	10,985	11,406	11,914	12,535	1.0
Japan	5,989	6,198	6,396	6,418	6,410	6,328	6,275	6,275	0.1
South Korea	1,266	1,432	1,616	1,781	1,921	2,065	2,229	2,404	1.8
Australia and New Zealand	1,591	1,811	2,058	2,334	2,654	3,013	3,410	3,856	2.6
Total OECD	48,476	52,787	57,786	62,185	67,011	72,140	77,452	83,077	1.6
Non-OECD									
Non-OECD Europe and Eurasia	2,747	3,002	3,264	3,562	3,933	4,260	4,537	4,788	1.6
Russia	1,733	1,859	1,968	2,116	2,313	2,456	2,549	2,599	1.2
Other	1,014	1,143	1,296	1,446	1,620	1,804	1,988	2,189	2.2
Non-OECD Asia	14,966	19,582	24,738	30,287	36,173	42,325	48,529	54,212	3.7
China	8,910	11,807	14,950	18,333	21,858	25,420	28,960	32,011	3.7
India	2,193	3,074	4,028	5,064	6,210	7,446	8,660	9,701	4.3
Other	3,863	4,701	5,761	6,889	8,106	9,460	10,909	12,500	3.4
Middle East	2,210	2,637	3,084	3,594	4,138	4,669	5,264	5,786	2.8
Africa	2,306	2,660	3,231	3,913	4,754	5,788	7,042	8,550	3.8
Non-OECD Americas	4,362	4,721	5,435	6,013	6,612	7,263	7,943	8,626	2.0
Brazil	2,331	2,465	2,801	3,021	3,235	3,463	3,680	3,881	1.5
Other	2,031	2,256	2,634	2,992	3,377	3,800	4,263	4,745	2.5
Total Non-OECD	26,590	32,602	39,752	47,368	55,610	64,306	73,315	81,962	3.3
Total World	75,066	85,389	97,538	109,553	122,621	136,446	150,767	165,038	2.3

a/ Includes the 50 states and the District of Columbia.

Notes: Totals may not equal sum of components due to independent rounding.

Sources: derived from Oxford Economic Model (March 2017), www.oxfordeconomics.com (subscription site) and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A5. World liquids consumption by region, Reference case, 2015-50

million barrels per day

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	24.3	24.7	24.3	23.7	23.7	24.1	24.8	25.6	0.2
United States /a	19.5	20.1	19.8	19.1	19.0	19.3	19.8	20.6	0.1
Canada	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.3	-0.1
Mexico and Chile	2.3	2.2	2.3	2.3	2.4	2.6	2.7	2.8	0.5
OECD Europe	14.0	13.9	13.3	13.1	13.0	12.9	12.7	12.6	-0.3
OECD Asia	7.8	7.5	7.4	7.5	7.5	7.6	7.7	7.8	0.0
Japan	4.1	3.6	3.5	3.4	3.3	3.2	3.1	3.0	-0.9
South Korea	2.4	2.6	2.6	2.6	2.7	2.8	2.9	3.0	0.6
Australia and New Zealand	1.3	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.0
Total OECD	46.1	46.1	45.1	44.3	44.2	44.7	45.1	46.1	0.0
Non-OECD									
Non-OECD Europe and Eurasia	5.7	5.7	5.5	5.3	5.4	5.3	5.3	5.2	-0.3
Russia	3.7	3.7	3.6	3.5	3.5	3.4	3.3	3.2	-0.4
Other	1.9	2.0	1.9	1.8	1.9	1.9	1.9	2.0	0.0
Non-OECD Asia	24.3	27.7	30.8	33.5	36.1	39.0	41.5	43.3	1.7
China	12.1	13.8	15.5	16.4	16.9	17.0	17.0	16.4	0.9
India	4.0	5.0	5.4	6.1	7.1	8.3	9.4	10.2	2.7
Other	8.2	8.9	9.9	11.0	12.2	13.6	15.1	16.7	2.0
Middle East	8.3	9.2	9.0	8.7	9.2	9.8	10.5	11.0	0.8
Africa	4.1	4.4	4.4	4.7	5.1	5.8	6.5	7.4	1.7
Non-OECD Americas	6.8	6.9	7.3	7.6	7.9	8.4	8.9	9.4	0.9
Brazil	3.1	3.0	3.3	3.5	3.6	3.8	4.0	4.1	0.8
Other	3.7	3.9	4.0	4.1	4.3	4.6	4.9	5.2	1.0
Total Non-OECD	49.2	53.9	56.9	59.8	63.8	68.3	72.6	76.2	1.3
Total World	95.3	99.9	102.0	104.1	108.0	112.9	117.7	122.3	0.7

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A6. World natural gas consumption by region, Reference case, 2015-50

trillion cubic feet

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	34.1	34.4	36.0	37.7	39.2	41.2	43.2	45.2	0.8
United States /a	27.3	27.3	28.2	29.5	30.7	31.9	33.2	34.6	0.7
Canada	4.1	4.2	4.7	5.0	5.2	5.6	6.0	6.3	1.3
Mexico and Chile	2.7	2.8	3.1	3.2	3.3	3.7	4.0	4.3	1.3
OECD Europe	16.8	17.4	17.5	18.1	20.3	22.2	24.4	27.0	1.4
OECD Asia	8.1	8.1	8.4	9.0	9.5	10.2	10.8	11.6	1.0
Japan	4.7	4.6	4.7	4.7	4.7	4.7	4.7	4.8	0.0
South Korea	1.7	1.9	2.0	2.1	2.3	2.6	2.8	3.0	1.6
Australia and New Zealand	1.6	1.6	1.8	2.1	2.5	2.9	3.3	3.8	2.5
Total OECD	59.0	59.9	62.0	64.8	69.1	73.5	78.4	83.9	1.0
Non-OECD									
Non-OECD Europe and Eurasia	21.1	20.6	20.6	20.8	21.3	21.6	21.6	21.6	0.1
Russia	14.5	14.0	14.1	14.1	14.4	14.5	14.3	14.1	-0.1
Other	6.6	6.6	6.6	6.7	7.0	7.1	7.3	7.5	0.3
Non-OECD Asia	17.8	20.0	25.5	30.0	36.4	43.2	50.7	58.2	3.4
China	6.9	8.9	12.0	14.7	17.6	20.8	24.6	28.3	4.1
India	1.9	2.0	2.6	3.1	4.0	4.9	5.9	7.1	3.9
Other	9.1	9.1	11.0	12.2	14.8	17.5	20.2	22.9	2.7
Middle East	15.5	15.6	18.0	20.6	22.6	24.5	27.0	29.2	1.8
Africa	4.9	5.3	5.9	6.1	6.3	6.9	7.5	8.2	1.4
Non-OECD Americas	5.7	5.4	6.0	6.2	6.6	7.3	8.0	8.7	1.2
Brazil	1.3	1.3	1.5	1.6	1.6	1.8	2.0	2.2	1.4
Other	4.4	4.1	4.5	4.7	4.9	5.5	6.0	6.5	1.2
Total Non-OECD	65.1	66.9	76.0	83.7	93.2	103.5	114.7	125.9	1.9
Total World	124.1	126.8	138.0	148.5	162.3	177.0	193.2	209.8	1.5

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A7. World coal consumption by region, Reference case, 2015-50

quadrillion Btu

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	16.8	16.5	14.7	12.6	12.0	11.5	11.2	10.8	-1.2
United States /a	15.5	15.2	13.5	11.5	11.0	10.5	10.2	9.8	-1.3
Canada	0.7	0.6	0.6	0.4	0.4	0.4	0.4	0.4	-1.8
Mexico and Chile	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.6	-0.1
OECD Europe	11.8	12.3	11.9	11.7	11.7	11.6	11.7	12.1	0.1
OECD Asia	9.1	9.0	9.1	9.1	9.1	9.2	9.3	9.5	0.1
Japan	4.3	4.2	4.1	4.0	3.8	3.7	3.5	3.4	-0.6
South Korea	3.1	3.2	3.4	3.6	3.7	3.9	4.2	4.5	1.1
Australia and New Zealand	1.7	1.6	1.6	1.6	1.6	1.5	1.5	1.5	-0.3
Total OECD	37.7	37.9	35.8	33.4	32.8	32.3	32.2	32.4	-0.4
Non-OECD									
Non-OECD Europe and Eurasia	8.2	7.8	7.6	7.5	7.7	7.6	7.5	7.3	-0.3
Russia	4.2	3.8	3.6	3.8	3.9	3.9	3.8	3.7	-0.4
Other	4.0	4.0	3.9	3.8	3.7	3.7	3.7	3.7	-0.3
Non-OECD Asia	106.9	110.1	111.8	111.0	111.7	113.0	114.7	116.2	0.2
China	85.5	84.9	83.6	80.4	76.6	73.0	69.3	65.5	-0.8
India	13.9	15.7	17.3	19.3	22.7	26.3	30.3	33.6	2.6
Other	7.5	9.5	10.9	11.3	12.4	13.6	15.1	17.1	2.4
Middle East	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.5	5.3
Africa	4.3	4.9	5.4	5.5	5.6	5.9	6.2	6.6	1.2
Non-OECD Americas	1.1	1.1	1.1	1.2	1.2	1.3	1.5	1.6	1.1
Brazil	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0
Other	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7	1.3
Total Non-OECD	120.5	124.1	126.1	125.5	126.5	128.2	130.3	132.2	0.3
Total World	158.2	161.9	161.9	158.8	159.3	160.5	162.5	164.6	0.1

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A8. World nuclear energy consumption by region (net nuclear electricity generation), Reference case, 2015-50

billion kilowatthours

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	903	858	854	863	820	775	716	652	-0.9
United States /a	797	762	773	768	721	702	660	608	-0.8
Canada	94	85	70	76	71	50	39	27	-3.5
Mexico and Chile	11	11	11	20	28	23	17	17	1.1
OECD Europe	828	728	662	663	620	594	494	401	-2.1
OECD Asia	168	305	376	378	391	404	417	430	2.7
Japan	7	99	126	115	115	115	115	115	8.4
South Korea	161	206	250	263	276	289	302	315	1.9
Australia and New Zealand	0	0	0	0	0	0	0	0	0.0
Total OECD	1,899	1,891	1,893	1,904	1,832	1,773	1,627	1,483	-0.7
Non-OECD									
Non-OECD Europe and Eurasia	293	356	408	398	388	382	382	392	0.8
Russia	180	228	261	233	222	216	216	216	0.5
Other	113	128	147	165	165	165	165	175	1.3
Non-OECD Asia	275	409	571	787	1,037	1,329	1,547	1,730	5.4
China	197	308	428	545	779	1,044	1,275	1,458	5.9
India	33	57	106	206	222	249	236	236	5.8
Other	46	45	36	36	36	36	36	36	-0.7
Middle East	4	47	55	77	100	115	115	124	10.6
Africa	14	14	14	24	20	20	30	40	3.1
Non-OECD Americas	26	36	41	41	39	39	34	34	0.7
Brazil	14	23	23	23	23	23	19	19	0.8
Other	12	12	18	18	15	15	15	15	0.6
Total Non-OECD	611	862	1,088	1,327	1,583	1,884	2,108	2,320	3.9
Total World	2,510	2,753	2,981	3,231	3,414	3,657	3,735	3,804	1.2

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A9. World consumption of hydroelectricity and other renewable energy by region, Reference case, 2015-50

quadrillion Btu

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	14.0	16.1	18.1	19.0	20.2	21.4	22.7	23.8	1.5
United States /a	8.4	10.4	12.5	13.0	13.5	14.4	15.4	16.2	1.9
Canada	4.4	4.5	4.5	4.6	4.8	5.0	5.2	5.3	0.5
Mexico and Chile	1.2	1.1	1.1	1.4	1.8	2.0	2.1	2.3	1.9
OECD Europe	13.6	14.5	17.2	19.2	19.4	20.4	20.9	21.7	1.3
OECD Asia	3.2	3.3	4.4	5.0	5.3	5.6	6.0	6.4	2.0
Japan	2.0	1.9	2.4	2.4	2.5	2.5	2.5	2.5	0.7
South Korea	0.2	0.2	0.5	0.9	0.9	1.0	1.0	1.1	4.7
Australia and New Zealand	0.9	1.2	1.5	1.7	1.9	2.1	2.4	2.7	3.1
Total OECD	30.7	33.8	39.7	43.2	44.9	47.4	49.6	51.9	1.5
Non-OECD									
Non-OECD Europe and Eurasia	3.3	3.3	3.3	3.7	3.8	4.0	4.2	4.5	0.9
Russia	1.8	1.8	1.8	2.2	2.3	2.3	2.3	2.3	0.7
Other	1.5	1.5	1.5	1.5	1.5	1.7	1.9	2.2	1.1
Non-OECD Asia	22.8	30.8	35.4	42.5	46.9	52.0	57.3	62.4	2.9
China	14.2	21.3	24.5	27.3	30.1	33.0	35.8	38.7	2.9
India	4.0	4.9	6.0	7.1	8.3	9.8	11.2	12.4	3.3
Other	4.5	4.6	4.9	8.1	8.4	9.3	10.3	11.3	2.7
Middle East	0.2	0.2	0.7	0.9	1.2	1.5	1.6	1.8	6.1
Africa	4.6	4.6	4.7	6.2	8.0	9.0	9.7	10.4	2.3
Non-OECD Americas	10.1	10.0	11.0	12.0	13.2	14.0	14.9	15.7	1.3
Brazil	6.6	6.6	7.6	8.2	8.8	9.5	10.0	10.5	1.3
Other	3.5	3.4	3.4	3.9	4.4	4.6	4.9	5.2	1.1
Total Non-OECD	41.0	48.9	55.1	65.3	73.1	80.6	87.8	94.8	2.4
Total World	71.7	82.7	94.8	108.4	117.9	128.0	137.3	146.6	2.1

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A10. World carbon dioxide emissions by region, Reference case, 2015-50

million metric tons carbon dioxide

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	6,342	6,341	6,175	5,967	5,970	6,074	6,217	6,385	0.0
United States /a	5,248	5,260	5,057	4,839	4,816	4,867	4,957	5,073	-0.1
Canada	590	587	601	596	608	626	649	672	0.4
Mexico and Chile	504	494	518	532	547	581	611	640	0.7
OECD Europe	3,858	3,923	3,814	3,798	3,903	3,988	4,097	4,261	0.3
OECD Asia	2,234	2,186	2,209	2,243	2,284	2,333	2,389	2,466	0.3
Japan	1,154	1,073	1,058	1,038	1,014	987	961	945	-0.6
South Korea	663	702	721	751	791	835	881	930	1.0
Australia and New Zealand	417	411	430	454	479	510	547	592	1.0
Total OECD	12,433	12,450	12,198	12,008	12,157	12,395	12,703	13,111	0.2
Non-OECD									
Non-OECD Europe and Eurasia	2,692	2,630	2,583	2,570	2,617	2,625	2,600	2,574	-0.1
Russia	1,676	1,610	1,583	1,587	1,616	1,615	1,582	1,541	-0.2
Other	1,016	1,021	999	983	1,001	1,010	1,018	1,033	0.0
Non-OECD Asia	14,294	15,168	16,050	16,589	17,384	18,286	19,226	20,057	1.0
China	9,924	10,205	10,464	10,422	10,298	10,161	10,018	9,793	0.0
India	2,002	2,305	2,552	2,884	3,389	3,959	4,545	5,043	2.7
Other	2,368	2,657	3,034	3,284	3,697	4,165	4,664	5,221	2.3
Middle East	1,959	2,085	2,192	2,316	2,495	2,692	2,923	3,117	1.3
Africa	1,251	1,370	1,444	1,506	1,592	1,740	1,906	2,100	1.5
Non-OECD Americas	1,272	1,270	1,355	1,410	1,473	1,581	1,694	1,812	1.0
Brazil	482	470	514	540	561	596	633	668	0.9
Other	790	800	841	869	912	985	1,061	1,143	1.1
Total Non-OECD	21,469	22,523	23,624	24,390	25,561	26,923	28,349	29,660	0.9
Total World	33,902	34,972	35,823	36,398	37,718	39,318	41,052	42,771	0.7

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A11. World carbon dioxide emissions from liquids use by region, Reference case, 2015-50

million metric tons carbon dioxide

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	2,891	2,917	2,834	2,739	2,713	2,755	2,828	2,915	0.0
United States /a	2,294	2,345	2,261	2,164	2,127	2,151	2,208	2,278	0.0
Canada	302	296	286	281	280	281	284	289	-0.1
Mexico and Chile	295	277	287	294	306	323	335	347	0.5
OECD Europe	1,855	1,841	1,759	1,733	1,721	1,712	1,684	1,672	-0.3
OECD Asia	939	895	893	898	903	911	921	939	0.0
Japan	498	433	422	410	398	384	371	362	-0.9
South Korea	274	293	291	300	309	320	330	339	0.6
Australia and New Zealand	167	168	180	188	196	207	220	238	1.0
Total OECD	5,685	5,653	5,486	5,370	5,336	5,378	5,433	5,526	-0.1
Non-OECD									
Non-OECD Europe and Eurasia	779	779	752	735	740	735	725	715	-0.2
Russia	502	496	482	472	469	462	448	433	-0.4
Other	277	283	270	263	271	274	277	282	0.0
Non-OECD Asia	3,257	3,698	4,112	4,470	4,834	5,218	5,565	5,822	1.7
China	1,552	1,775	1,987	2,100	2,165	2,185	2,179	2,107	0.9
India	518	639	693	787	916	1,069	1,207	1,310	2.7
Other	1,187	1,284	1,432	1,583	1,754	1,964	2,179	2,405	2.0
Middle East	1,082	1,205	1,177	1,145	1,208	1,288	1,375	1,439	0.8
Africa	578	621	613	656	722	810	913	1,037	1.7
Non-OECD Americas	857	867	917	951	993	1,051	1,113	1,179	0.9
Brazil	352	341	372	390	405	426	446	467	0.8
Other	505	526	544	561	588	625	667	712	1.0
Total Non-OECD	6,552	7,170	7,572	7,957	8,496	9,103	9,691	10,192	1.3
Total World	12,237	12,823	13,058	13,327	13,832	14,480	15,123	15,718	0.7

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A12. World carbon dioxide emissions from natural gas use by region, Reference case, 2015-50

million metric tons carbon dioxide

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	1,845	1,853	1,939	2,032	2,115	2,223	2,331	2,443	0.8
United States /a	1,471	1,464	1,512	1,577	1,644	1,711	1,781	1,858	0.7
Canada	225	235	258	277	290	312	331	349	1.3
Mexico and Chile	149	154	170	177	182	200	219	236	1.3
OECD Europe	916	945	953	985	1,105	1,206	1,329	1,471	1.4
OECD Asia	457	461	478	508	541	577	615	656	1.0
Japan	265	258	261	265	266	265	266	269	0.0
South Korea	103	113	116	125	138	152	165	178	1.6
Australia and New Zealand	89	90	101	118	138	160	184	210	2.5
Total OECD	3,217	3,259	3,370	3,525	3,761	4,006	4,275	4,571	1.0
Non-OECD									
Non-OECD Europe and Eurasia	1,147	1,116	1,120	1,127	1,158	1,172	1,170	1,174	0.1
Russia	789	761	765	766	783	788	779	770	-0.1
Other	358	355	355	361	375	384	391	404	0.3
Non-OECD Asia	980	1,103	1,406	1,652	2,004	2,378	2,792	3,207	3.4
China	383	496	665	813	977	1,154	1,365	1,568	4.1
India	107	112	145	178	224	278	334	400	3.9
Other	491	495	597	661	803	946	1,093	1,239	2.7
Middle East	869	872	1,005	1,152	1,262	1,372	1,509	1,632	1.8
Africa	275	295	331	341	353	386	419	455	1.4
Non-OECD Americas	320	305	335	350	369	408	448	491	1.2
Brazil	75	76	83	88	92	101	112	123	1.4
Other	245	229	252	262	277	308	336	368	1.2
Total Non-OECD	3,592	3,691	4,196	4,622	5,145	5,716	6,339	6,958	1.9
Total World	6,809	6,949	7,566	8,147	8,906	9,721	10,614	11,529	1.5

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System run, ref2017.d120816a, www.eia.gov/aeo.

Table A13. World carbon dioxide emissions from coal use by region, Reference case, 2015-50

million metric tons carbon dioxide

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	1,606	1,571	1,402	1,196	1,143	1,097	1,059	1,027	-1.3
United States /a	1,483	1,452	1,284	1,099	1,045	1,005	968	937	-1.3
Canada	64	56	56	37	39	33	34	33	-1.8
Mexico and Chile	59	63	62	60	59	58	58	57	-0.1
OECD Europe	1,087	1,137	1,103	1,080	1,077	1,071	1,083	1,117	0.1
OECD Asia	838	831	838	838	841	844	854	871	0.1
Japan	392	382	375	363	351	338	325	313	-0.6
South Korea	286	296	314	327	344	363	386	414	1.1
Australia and New Zealand	160	152	149	147	146	144	143	144	-0.3
Total OECD	3,530	3,538	3,343	3,114	3,061	3,012	2,996	3,014	-0.5
Non-OECD									
Non-OECD Europe and Eurasia	766	736	711	708	719	718	705	686	-0.3
Russia	385	353	336	349	364	366	356	339	-0.4
Other	381	383	375	359	355	352	349	347	-0.3
Non-OECD Asia	10,057	10,367	10,532	10,467	10,547	10,689	10,870	11,028	0.3
China	7,989	7,934	7,812	7,509	7,157	6,823	6,474	6,118	-0.8
India	1,377	1,554	1,715	1,919	2,249	2,612	3,004	3,333	2.6
Other	691	879	1,005	1,040	1,141	1,255	1,392	1,576	2.4
Middle East	8	8	10	19	25	32	39	47	5.3
Africa	399	454	500	509	517	544	574	608	1.2
Non-OECD Americas	96	97	103	108	111	122	132	142	1.1
Brazil	56	53	59	62	64	69	75	79	1.0
Other	40	44	45	46	47	53	58	64	1.3
Total Non-OECD	11,325	11,663	11,857	11,811	11,919	12,104	12,320	12,510	0.3
Total World	14,855	15,200	15,199	14,924	14,980	15,116	15,316	15,524	0.1

a/ Includes the 50 states and the District of Columbia.

Sources: U.S. Energy Information Administration (EIA), World Energy Projection System Plus (2017), run IEO2017_d2017.08.23_153156 and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.

Table A14. World population by region, Reference case, 2015-50

millions

Region	2015	2020	2025	2030	2035	2040	2045	2050	Average annual percent change (2015-50)
OECD									
OECD Americas	501	524	547	568	586	603	617	630	0.7
United States /a	322	335	348	360	371	381	390	399	0.6
Canada	36	37	39	41	42	44	45	47	0.8
Mexico and Chile	143	152	160	167	173	178	182	185	0.7
OECD Europe	569	582	590	595	600	603	604	603	0.2
OECD Asia	205	207	208	208	207	206	204	201	0.0
Japan	127	125	123	121	118	114	111	108	-0.5
South Korea	50	51	52	52	53	53	52	51	0.0
Australia and New Zealand	28	30	32	35	37	39	41	43	1.2
Total OECD	1,275	1,313	1,344	1,371	1,393	1,411	1,425	1,435	0.3
Non-OECD									
Non-OECD Europe and Eurasia	336	335	333	329	324	319	314	310	-0.2
Russia	143	143	142	139	136	133	131	129	-0.3
Other	193	192	191	190	187	185	183	181	-0.2
Non-OECD Asia	3,791	3,972	4,129	4,261	4,370	4,457	4,521	4,564	0.5
China	1,369	1,398	1,413	1,416	1,410	1,398	1,379	1,354	0.0
India	1,295	1,374	1,447	1,515	1,574	1,625	1,666	1,699	0.8
Other	1,127	1,200	1,268	1,330	1,385	1,434	1,476	1,510	0.8
Middle East	225	243	259	275	290	304	318	330	1.1
Africa	1,144	1,284	1,433	1,589	1,756	1,932	2,114	2,301	2.0
Non-OECD Americas	484	507	527	545	559	571	580	586	0.5
Brazil	206	214	222	228	232	236	238	238	0.4
Other	278	292	305	317	327	336	343	348	0.6
Total Non-OECD	5,980	6,341	6,681	6,998	7,298	7,582	7,847	8,090	0.9
Total World	7,254	7,654	8,025	8,369	8,691	8,993	9,272	9,525	0.8

a/ Includes the 50 states and the District of Columbia.

Notes: Totals may not equal sum of components due to independent rounding.

Sources: Oxford Economic Model (March 2017), www.oxfordeconomics.com (subscription site) and EIA, *Annual Energy Outlook 2017*, DOE/EIA-0383(2017) (Washington, DC: January 2017); AEO2017 National Energy Modeling System, run ref2017.d120816a, www.eia.gov/aeo.