

Table F1. Total world delivered energy consumption by end-use sector and fuel, Reference case

quadrillion British thermal units

Sector and fuel	2022	2025	2030	2035	2040	2045	2050	Average annual percentage change, 2022–2050
Residential								
Liquid fuels	9.4	9.5	9.9	10.3	10.7	11.1	11.5	0.7%
Natural gas	23.1	23.7	24.9	26.0	27.0	28.2	29.4	0.9%
Coal	3.6	3.5	3.5	3.4	3.4	3.3	3.2	-0.4%
Electricity	25.4	26.7	29.7	32.5	36.0	40.2	44.4	2.0%
Renewables	1.6	1.6	1.6	1.6	1.6	1.6	1.6	0.1%
Total	63.1	65.1	69.5	73.8	78.7	84.4	90.2	1.3%
Commercial								
Liquid fuels	3.5	3.6	3.7	3.8	4.0	4.1	4.1	0.6%
Natural gas	9.4	9.6	10.1	10.5	10.8	11.2	11.5	0.7%
Coal	1.3	1.3	1.4	1.4	1.4	1.4	1.5	0.5%
Electricity	18.4	19.2	20.9	22.3	23.9	25.6	27.3	1.4%
Renewables	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4%
Total	32.8	34.0	36.4	38.3	40.4	42.6	44.8	1.1%
Industrial								
Liquid fuels	62.4	65.2	69.3	73.8	78.0	82.0	85.5	1.1%
Natural gas	63.9	65.8	70.2	74.2	78.7	83.3	88.0	1.1%
Coal	62.8	62.8	63.0	63.2	63.4	64.2	65.2	0.1%
Electricity	41.5	43.4	46.2	48.9	51.1	53.4	55.4	1.0%
Renewables	24.1	26.8	30.1	33.5	36.6	39.7	42.6	2.1%
Total	254.7	263.9	278.8	293.5	307.8	322.6	336.6	1.0%
Transportation								
Liquid fuels	109.7	114.1	115.4	117.2	119.9	124.2	129.1	0.6%
Natural gas	4.2	4.5	4.7	5.0	5.3	5.9	6.7	1.7%
Coal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Electricity	1.9	2.2	2.7	3.5	4.4	5.2	5.9	4.1%
Total	115.8	120.8	122.9	125.7	129.6	135.3	141.7	0.7%
Components of energy use								
End-use consumption								
Liquid fuels	184.9	192.4	198.4	205.2	212.5	221.3	230.3	0.8%
Natural gas	100.6	103.7	109.9	115.6	121.8	128.6	135.7	1.1%
Coal	67.7	67.7	67.8	68.0	68.1	68.9	69.9	0.1%
Electricity	87.3	91.4	99.5	107.3	115.5	124.4	133.0	1.5%
Renewables	25.9	28.6	31.9	35.3	38.5	41.6	44.5	2.0%
Total end-use consumption	466.5	483.8	507.6	531.3	556.5	584.8	613.4	1.0%
Electricity-related losses	171.3	178.1	190.9	205.0	215.4	228.1	240.5	1.2%
Discrepancy	0.1	-0.6	-0.2	0.1	0.3	0.6	0.9	9.4%
Total	637.8	661.4	698.2	736.4	772.2	813.6	854.7	1.1%
Electric power								
Liquid fuels	5.4	6.4	3.9	2.0	1.1	0.8	0.7	-7.2%
Natural gas	52.5	51.5	51.3	51.6	54.4	57.8	61.1	0.5%
Coal	98.2	96.1	98.2	102.4	101.1	101.4	102.1	0.1%
Nuclear	27.7	29.3	31.9	33.4	33.6	33.9	34.7	0.8%
Renewables	74.5	86.2	104.9	122.6	140.4	158.4	174.5	3.1%
Total	258.4	269.3	290.2	312.0	330.6	352.2	373.2	1.3%
Total energy consumption								
Liquid fuels	190.4	198.2	202.0	207.3	214.0	222.8	231.9	0.7%
Natural gas	153.3	155.4	161.4	167.4	176.4	186.5	197.0	0.9%
Coal	166.0	163.8	166.1	170.4	169.3	170.5	172.1	0.1%
Nuclear	27.7	29.3	31.9	33.4	33.6	33.9	34.7	0.8%
Renewables	100.5	114.8	136.8	157.9	178.9	199.9	219.0	2.8%

Total	637.8	661.4	698.2	736.4	772.2	813.6	854.7	1.1%
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Data source: U.S. Energy Information Administration, World Energy Projection System (2023), run r_230822.081459 and Annual Energy Outlook 2023 (March 2023), www.eia.gov/aeo

Note: Totals may not equal sum of components due to independent rounding. End-use sector electricity consumption and end-use sector delivered energy consumption do not include electrical system energy losses incurred in the generation, transmission, and distribution of electricity. Electricity-related losses include energy losses during generation due to thermal efficiency, energy losses during transmission and distribution, and parasitic load. In all regions except the United States, fuel consumed to produce district heat is allocated to the residential, commercial, and industrial end-use sectors according to their respective share of heat demand. We converted electricity generation from renewable sources such as hydroelectric, wind, or solar to British thermal units at a rate of 8,124 British thermal units per kilowatthour, which reflects the average projected conversion efficiency of the U.S. fossil-fueled generating fleet in the Annual Energy Outlook 2021 over the projection period (2022–2050).