Table E1. Total energy supply, disposition, and price summary

(quadrillion Btu per year, unless otherwise noted)

Supply, disposition, and prices	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Production										
Crude oil and lease condensate	23.87	28.61	28.57	28.55	27.39	27.31	27.33	26.84	26.64	26.62
Natural gas plant liquids	6.58	7.91	7.90	7.79	8.04	7.92	7.78	8.30	8.05	7.78
Dry natural gas	35.14	39.61	39.28	38.47	42.55	41.39	40.27	46.66	44.58	42.35
Coal[1]	10.80	10.25	10.14	9.79	9.52	9.28	8.87	9.35	9.08	7.97
Nuclear / uranium[2]	8.21	6.59	6.59	6.36	6.39	6.22	5.58	6.46	6.21	3.72
Conventional hydroelectric power	2.53	2.41	2.43	2.43	2.32	2.36	2.40	2.25	2.29	2.36
Biomass[3]	4.47	4.89	4.89	4.89	5.00	5.00	5.00	5.41	5.39	5.42
Other renewable energy[4]	4.43	8.36	9.52	11.14	9.03	11.84	14.65	9.51	14.11	20.55
Other[5]	0.69	0.65	0.65	0.66	0.68	0.69	0.69	0.69	0.71	0.73
Total	**96.72**	**109.28**	**109.97**	**110.08**	**110.93**	**112.00**	**112.56**	**115.46**	**117.08**	**117.51**
Imports										
Crude oil	13.44	15.50	15.42	15.53	16.61	16.68	16.64	16.82	17.02	17.14
Petroleum and other liquids[6]	4.17	3.83	3.90	3.84	3.64	3.66	3.64	3.69	3.69	3.65
Natural gas	2.65	2.25	2.22	2.18	2.16	2.10	2.03	2.05	1.92	1.77
Other imports[7]	0.24	0.18	0.19	0.19	0.19	0.18	0.17	0.18	0.17	0.14
Total	**20.51**	**21.76**	**21.72**	**21.73**	**22.60**	**22.63**	**22.48**	**22.75**	**22.80**	**22.70**
Exports										
Petroleum and other liquids[8]	16.43	21.35	21.32	21.25	20.69	20.69	20.51	19.20	19.04	19.00
Natural gas	5.31	8.61	8.93	8.94	8.79	9.23	9.45	8.87	9.36	9.61
Coal	1.81	2.48	2.48	2.53	2.43	2.43	2.43	2.41	2.45	2.45
Total	**23.55**	**32.44**	**32.74**	**32.72**	**31.91**	**32.35**	**32.38**	**30.48**	**30.85**	**31.05**
Discrepancy[9]	**0.75**	**0.38**	**0.39**	**0.39**	**0.36**	**0.35**	**0.36**	**0.36**	**0.36**	**0.35**
Consumption										
Petroleum and other liquids[10]	33.55	36.91	36.88	36.87	37.49	37.39	37.39	39.15	39.08	38.96
Natural gas	31.89	32.81	32.12	31.26	35.51	33.86	32.42	39.40	36.70	34.07
Coal[11]	8.99	7.73	7.61	7.22	7.06	6.81	6.40	6.91	6.60	5.49
Nuclear / uranium[2]	8.21	6.59	6.59	6.36	6.39	6.22	5.58	6.46	6.21	3.72
Conventional hydroelectric power	2.53	2.41	2.43	2.43	2.32	2.36	2.40	2.25	2.29	2.36
Biomass[12]	3.05	3.12	3.12	3.12	3.18	3.18	3.17	3.41	3.40	3.42
Other renewable energy[4]	4.43	8.36	9.52	11.14	9.03	11.84	14.65	9.51	14.11	20.55
Other[13]	0.27	0.29	0.30	0.30	0.29	0.29	0.27	0.28	0.27	0.24
Total	**92.92**	**98.22**	**98.56**	**98.69**	**101.27**	**101.94**	**102.29**	**107.37**	**108.66**	**108.81**
Prices (2020 dollars per unit)										
Crude oil spot prices (dollars per barrel)										
Brent	41	73	73	73	87	87	87	97	95	97
West Texas Intermediate	39	71	71	71	84	84	84	94	91	94
Natural gas at Henry Hub (dollars per million Btu)	2.07	3.42	3.34	3.21	3.66	3.55	3.43	3.95	3.69	3.42
Coal (dollars per ton) at the minemouth[14]	34.1	29.4	29.4	29.7	31.8	32.0	32.5	34.6	34.7	35.7
Coal (dollars per million Btu) at the minemouth[14]	1.68	1.45	1.45	1.45	1.54	1.55	1.56	1.66	1.66	1.69
Average end-use[15]	2.12	1.98	1.97	1.96	1.99	1.98	1.96	2.05	2.01	1.99
Average electricity (cents per kilowatthour)	10.4	10.4	10.3	10.1	10.3	10.1	9.9	10.0	9.6	9.3

Table E1. Total energy supply, disposition, and price summary (continued)
(quadrillion Btu per year, unless otherwise noted)

Supply, disposition, and prices	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Prices (nominal dollars per unit)										
Crude oil spot prices (dollars per barrel)										
Brent	41	89	89	90	132	132	132	191	185	190
West Texas Intermediate	39	87	86	87	128	128	128	184	178	183
Natural gas at Henry Hub (dollars per million Btu)	2.07	4.18	4.08	3.92	5.58	5.40	5.21	7.75	7.21	6.69
Coal (dollars per ton)										
at the minemouth[14]	34.1	35.8	35.8	36.2	48.5	48.7	49.5	67.8	67.7	69.9
Coal (dollars per million Btu)										
at the minemouth[14]	1.68	1.77	1.77	1.77	2.35	2.36	2.38	3.26	3.25	3.31
Average end-use[15]	2.12	2.41	2.40	2.39	3.03	3.01	2.99	4.01	3.92	3.90
Average electricity (cents per kilowatthour)	10.4	12.6	12.5	12.4	15.6	15.3	15.1	19.6	18.8	18.2

[1]Includes waste coal.
[2]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.
[3]Includes grid-connected electricity from wood and wood waste; biomass, such as corn, used for liquid fuels production; and non-electric energy demand from wood. Refer to Table A17 for details.
[4]Includes grid-connected electricity from landfill gas; biogenic municipal waste; wind; photovoltaic and solar thermal sources; and non-electric energy from renewable sources, such as active and passive solar systems. Excludes electricity imports using renewable sources and nonmarketed renewable energy. See Table A17 for selected nonmarketed residential and commercial renewable energy data.
[5]Includes non-biogenic municipal waste, liquid hydrogen, methanol, and some domestic inputs to refineries.
[6]Includes imports of finished petroleum products, unfinished oils, alcohols, ethers, blending components, and renewable fuels such as ethanol.
[7]Includes coal, coal coke (net), and electricity (net). Excludes imports of fuel used in nuclear power plants.
[8]Includes crude oil, petroleum products, ethanol, and biodiesel.
[9]Balancing item. Includes unaccounted for supply, losses, gains, and net storage withdrawals.
[10]Estimated consumption. Includes petroleum-derived fuels and non-petroleum derived fuels, such as ethanol and biodiesel, and coal-based synthetic liquids. Petroleum coke, which is a solid, is included. Also included are hydrocarbon gas liquids and crude oil consumed as a fuel. Refer to Table A17 for detailed renewable liquid fuels consumption.
[11]Excludes coal converted to coal-based synthetic liquids and natural gas.
[12]Includes grid-connected electricity from wood and wood waste, non-electric energy from wood, and biofuels heat and coproducts used in the production of liquid fuels, but excludes the energy content of the liquid fuels.
[13]Includes non-biogenic municipal waste, liquid hydrogen, and net electricity imports.
[14]Includes reported prices for both open market and captive mines. Prices weighted by production, which differs from average minemouth prices published in EIA data reports where it is weighted by reported sales.
[15]Prices weighted by consumption; weighted average excludes export free-alongside-ship (f.a.s.) prices.
Btu = British thermal unit.
Note: Totals may not equal sum of components due to independent rounding. Data for 2020 are model results and may differ from official EIA data reports.
Sources: 2020: Energy Information Administration (EIA), *Short-Term Energy Outlook*, October 2020 and EIA, AEO2021 National Energy Modeling System run ref2021.d113020a. **Projections:** EIA, AEO2021 National Energy Modeling System runs hirencst.d113020a, ref2021.d113020a, and lowrencst.d113020a.

Table E2. Energy consumption by sector and source

(quadrillion Btu per year, unless otherwise noted)

Sector and source	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Energy consumption										
Residential										
Propane	0.46	0.44	0.44	0.44	0.42	0.42	0.42	0.42	0.42	0.41
Distillate fuel oil[1]	0.43	0.38	0.37	0.38	0.32	0.32	0.32	0.28	0.28	0.28
Petroleum and other liquids subtotal	0.88	0.82	0.82	0.82	0.75	0.74	0.74	0.69	0.69	0.69
Natural gas	4.97	4.90	4.90	4.91	4.84	4.84	4.85	4.81	4.82	4.84
Renewable energy[2]	0.46	0.44	0.44	0.44	0.38	0.38	0.38	0.34	0.34	0.34
Electricity	5.05	5.25	5.26	5.28	5.65	5.67	5.69	6.12	6.18	6.20
Delivered energy	**11.36**	**11.41**	**11.42**	**11.44**	**11.61**	**11.64**	**11.65**	**11.96**	**12.03**	**12.06**
Electricity related losses	9.42	8.62	8.73	8.81	8.73	9.03	9.29	8.97	9.50	9.81
Total	**20.78**	**20.02**	**20.15**	**20.25**	**20.34**	**20.67**	**20.94**	**20.93**	**21.54**	**21.87**
Commercial										
Propane	0.17	0.18	0.18	0.18	0.20	0.20	0.20	0.22	0.22	0.22
Motor gasoline[3]	0.32	0.37	0.37	0.37	0.37	0.37	0.37	0.38	0.38	0.38
Kerosene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Distillate fuel oil	0.31	0.32	0.32	0.32	0.30	0.30	0.30	0.28	0.28	0.28
Residual fuel oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum and other liquids subtotal	0.81	0.88	0.88	0.88	0.88	0.87	0.87	0.88	0.88	0.88
Natural gas	3.31	3.62	3.63	3.64	3.68	3.68	3.69	3.71	3.73	3.75
Coal	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Renewable energy[4]	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Electricity	4.34	4.76	4.76	4.75	5.05	5.04	4.92	5.65	5.62	5.40
Delivered energy	**8.60**	**9.40**	**9.41**	**9.40**	**9.75**	**9.74**	**9.63**	**10.38**	**10.38**	**10.17**
Electricity related losses	8.08	7.81	7.90	7.92	7.81	8.02	8.04	8.28	8.65	8.55
Total	**16.68**	**17.21**	**17.31**	**17.33**	**17.55**	**17.75**	**17.67**	**18.66**	**19.03**	**18.72**
Industrial[5]										
Liquefied petroleum gases and other[6]	3.13	4.30	4.30	4.30	4.82	4.80	4.80	5.23	5.20	5.17
Motor gasoline[3]	0.24	0.30	0.30	0.30	0.34	0.34	0.34	0.39	0.39	0.38
Distillate fuel oil	1.13	1.38	1.38	1.38	1.56	1.55	1.55	1.80	1.80	1.79
Residual fuel oil	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Petrochemical feedstocks	0.58	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.66
Other petroleum[7]	3.21	3.43	3.42	3.41	3.64	3.62	3.62	3.83	3.82	3.80
Petroleum and other liquids subtotal	8.33	10.10	10.09	10.08	11.05	11.02	11.01	11.95	11.91	11.84
Natural gas	8.48	9.34	9.37	9.40	10.08	10.12	10.13	11.17	11.22	11.30
Natural-gas-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lease and plant fuel[8]	1.87	2.14	2.13	2.10	2.34	2.29	2.25	2.54	2.44	2.35
Natural gas to liquefy gas for export[9]	0.36	0.72	0.77	0.77	0.72	0.78	0.81	0.72	0.78	0.81
Natural gas subtotal	10.71	12.20	12.26	12.26	13.14	13.20	13.20	14.42	14.44	14.46
Metallurgical coal	0.47	0.41	0.41	0.41	0.40	0.39	0.39	0.41	0.41	0.41
Other industrial coal	0.49	0.44	0.44	0.44	0.42	0.42	0.42	0.47	0.47	0.46
Coal-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net coal coke imports	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Coal subtotal	0.93	0.83	0.83	0.83	0.80	0.79	0.79	0.86	0.86	0.85
Biofuels heat and coproducts	0.90	0.90	0.90	0.90	0.96	0.96	0.96	1.06	1.06	1.06
Renewable energy[10]	1.53	1.62	1.62	1.62	1.69	1.69	1.68	1.88	1.87	1.87
Electricity	3.07	3.51	3.51	3.52	3.72	3.73	3.74	3.99	4.02	4.04
Delivered energy	**25.47**	**29.17**	**29.22**	**29.21**	**31.36**	**31.38**	**31.37**	**34.17**	**34.16**	**34.12**
Electricity related losses	5.72	5.76	5.83	5.87	5.76	5.93	6.10	5.86	6.18	6.39
Total	**31.18**	**34.93**	**35.06**	**35.09**	**37.12**	**37.31**	**37.47**	**40.02**	**40.34**	**40.51**

Table E2. Energy consumption by sector and source (continued)

(quadrillion Btu per year, unless otherwise noted)

Sector and source	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Transportation										
Propane	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Motor gasoline[3]	14.83	14.83	14.80	14.82	14.35	14.33	14.35	14.58	14.58	14.58
of which: E85[11]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Jet fuel[12]	2.24	3.63	3.63	3.63	4.07	4.06	4.07	4.54	4.54	4.54
Distillate fuel oil[13]	6.15	6.27	6.24	6.26	6.03	6.02	6.00	6.24	6.21	6.18
Residual fuel oil	0.43	0.57	0.61	0.57	0.56	0.52	0.55	0.48	0.47	0.47
Other petroleum[14]	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Petroleum and other liquids subtotal	23.79	25.46	25.43	25.44	25.17	25.09	25.12	26.00	25.96	25.92
Pipeline and distribution fuel natural gas	0.71	0.62	0.61	0.60	0.66	0.65	0.63	0.74	0.71	0.69
Compressed / liquefied natural gas	0.09	0.15	0.16	0.16	0.27	0.29	0.27	0.42	0.45	0.44
Liquid hydrogen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.04	0.10	0.10	0.10	0.22	0.23	0.23	0.41	0.41	0.41
Delivered energy	**24.62**	**26.33**	**26.31**	**26.30**	**26.33**	**26.26**	**26.26**	**27.58**	**27.54**	**27.47**
Electricity related losses	0.07	0.16	0.16	0.16	0.35	0.36	0.37	0.60	0.64	0.66
Total	**24.69**	**26.49**	**26.47**	**26.46**	**26.67**	**26.62**	**26.63**	**28.18**	**28.18**	**28.13**
Unspecified sector[15]	**-0.41**	**-0.43**	**-0.42**	**-0.43**	**-0.42**	**-0.41**	**-0.42**	**-0.43**	**-0.42**	**-0.43**
Delivered energy consumption for all sectors										
Liquefied petroleum gases and other[6]	3.76	4.94	4.94	4.93	5.45	5.44	5.43	5.88	5.84	5.81
Motor gasoline[3]	15.23	15.33	15.32	15.33	14.91	14.89	14.90	15.18	15.19	15.17
of which: E85[11]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Jet fuel[12]	2.23	3.62	3.62	3.62	4.05	4.05	4.05	4.53	4.53	4.52
Kerosene[16]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Distillate fuel oil[1]	7.77	8.09	8.06	8.07	7.96	7.94	7.92	8.34	8.31	8.27
Residual fuel oil	0.46	0.61	0.65	0.61	0.60	0.56	0.59	0.53	0.52	0.51
Petrochemical feedstocks	0.58	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.66
Other petroleum[17]	3.35	3.58	3.57	3.56	3.79	3.77	3.77	3.97	3.97	3.94
Petroleum and other liquids subtotal	33.40	36.82	36.80	36.78	37.42	37.31	37.33	39.09	39.02	38.90
Natural gas	16.85	18.02	18.07	18.10	18.86	18.93	18.94	20.12	20.22	20.32
Natural-gas-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lease and plant fuel[8]	1.87	2.14	2.13	2.10	2.34	2.29	2.25	2.54	2.44	2.35
Natural gas to liquefy gas for export[9]	0.36	0.72	0.77	0.77	0.72	0.78	0.81	0.72	0.78	0.81
Pipeline and distribution fuel natural gas	0.71	0.62	0.61	0.60	0.66	0.65	0.63	0.74	0.71	0.69
Natural gas subtotal	19.78	21.49	21.57	21.56	22.59	22.66	22.64	24.11	24.16	24.18
Metallurgical coal	0.47	0.41	0.41	0.41	0.40	0.39	0.39	0.41	0.41	0.41
Other coal	0.50	0.45	0.46	0.46	0.44	0.44	0.43	0.48	0.48	0.48
Coal-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net coal coke imports	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Coal subtotal	0.95	0.84	0.84	0.84	0.81	0.81	0.81	0.87	0.87	0.86
Biofuels heat and coproducts	0.90	0.90	0.90	0.90	0.96	0.96	0.96	1.06	1.06	1.06
Renewable energy[18]	2.12	2.19	2.19	2.19	2.20	2.20	2.19	2.34	2.34	2.34
Liquid hydrogen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	12.49	13.62	13.63	13.64	14.65	14.67	14.57	16.17	16.24	16.05
Delivered energy	**69.64**	**75.87**	**75.94**	**75.92**	**78.63**	**78.60**	**78.50**	**83.66**	**83.69**	**83.39**
Electricity related losses	23.28	22.35	22.63	22.77	22.64	23.34	23.79	23.71	24.98	25.42
Total	**92.92**	**98.22**	**98.56**	**98.69**	**101.27**	**101.94**	**102.29**	**107.37**	**108.66**	**108.81**
Electric power[19]										
Distillate fuel oil	0.07	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04
Residual fuel oil	0.08	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Petroleum and other liquids subtotal	0.15	0.09	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.05
Natural gas	12.11	11.32	10.55	9.70	12.92	11.20	9.78	15.29	12.54	9.90
Steam coal	8.04	6.89	6.77	6.38	6.25	6.00	5.60	6.04	5.73	4.63
Nuclear / uranium[20]	8.21	6.59	6.59	6.36	6.39	6.22	5.58	6.46	6.21	3.72
Renewable energy[21]	6.99	10.80	11.97	13.60	11.37	14.22	17.07	11.76	16.41	22.93
Non-biogenic municipal waste	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Electricity imports	0.16	0.18	0.18	0.18	0.17	0.17	0.15	0.16	0.15	0.12
Total	**35.77**	**35.97**	**36.26**	**36.41**	**37.29**	**38.00**	**38.37**	**39.88**	**41.21**	**41.47**

Table E2. Energy consumption by sector and source (continued)

(quadrillion Btu per year, unless otherwise noted)

Sector and source	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Total energy consumption										
Liquefied petroleum gases and other[6]	3.76	4.94	4.94	4.93	5.45	5.44	5.43	5.88	5.84	5.81
Motor gasoline[3]	15.23	15.33	15.32	15.33	14.91	14.89	14.90	15.18	15.19	15.17
of which: E85[11]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Jet fuel[12]	2.23	3.62	3.62	3.62	4.05	4.05	4.05	4.53	4.53	4.52
Kerosene[16]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Distillate fuel oil[1]	7.84	8.15	8.11	8.13	8.01	7.99	7.97	8.38	8.35	8.31
Residual fuel oil	0.54	0.65	0.68	0.65	0.63	0.59	0.62	0.55	0.53	0.53
Petrochemical feedstocks	0.58	0.65	0.65	0.65	0.66	0.66	0.66	0.66	0.66	0.66
Other petroleum[17]	3.35	3.58	3.57	3.56	3.79	3.77	3.77	3.97	3.97	3.94
Petroleum and other liquids subtotal	33.55	36.91	36.88	36.87	37.49	37.39	37.39	39.15	39.08	38.96
Natural gas	28.96	29.33	28.61	27.80	31.78	30.14	28.73	35.40	32.76	30.22
Natural-gas-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lease and plant fuel[8]	1.87	2.14	2.13	2.10	2.34	2.29	2.25	2.54	2.44	2.35
Natural gas to liquefy gas for export[9]	0.36	0.72	0.77	0.77	0.72	0.78	0.81	0.72	0.78	0.81
Pipeline and distribution fuel natural gas	0.71	0.62	0.61	0.60	0.66	0.65	0.63	0.74	0.71	0.69
Natural gas subtotal	31.89	32.81	32.12	31.26	35.51	33.86	32.42	39.40	36.70	34.07
Metallurgical coal	0.47	0.41	0.41	0.41	0.40	0.39	0.39	0.41	0.41	0.41
Other coal	8.54	7.34	7.23	6.83	6.68	6.44	6.03	6.52	6.21	5.10
Coal-to-liquids heat and power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net coal coke imports	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Coal subtotal	8.99	7.73	7.61	7.22	7.06	6.81	6.40	6.91	6.60	5.49
Nuclear / uranium[20]	8.21	6.59	6.59	6.36	6.39	6.22	5.58	6.46	6.21	3.72
Biofuels heat and coproducts	0.90	0.90	0.90	0.90	0.96	0.96	0.96	1.06	1.06	1.06
Renewable energy[22]	9.11	12.99	14.17	15.79	13.57	16.42	19.26	14.11	18.75	25.27
Liquid hydrogen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-biogenic municipal waste	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Electricity imports	0.16	0.18	0.18	0.18	0.17	0.17	0.15	0.16	0.15	0.12
Total	**92.92**	**98.22**	**98.56**	**98.69**	**101.27**	**101.94**	**102.29**	**107.37**	**108.66**	**108.81**
Energy use and related statistics										
Delivered energy use	69.64	75.87	75.94	75.92	78.63	78.60	78.50	83.66	83.69	83.39
Total energy use	92.92	98.22	98.56	98.69	101.27	101.94	102.29	107.37	108.66	108.81
Ethanol consumed in motor gasoline and E85	1.08	1.17	1.17	1.17	1.20	1.20	1.20	1.27	1.27	1.27
Population (millions)	330.41	352.60	352.60	352.60	370.87	370.87	370.87	386.16	386.16	386.16
Gross domestic product (billion 2012 dollars)	18,171	23,289	23,289	23,290	28,377	28,371	28,375	34,323	34,365	34,333
Carbon dioxide emissions (million metric tons)	4,562.5	4,630.2	4,583.5	4,496.2	4,714.2	4,595.8	4,483.0	4,980.0	4,806.9	4,555.0

[1]Includes residential use of kerosene.
[2]Includes wood used for residential heating. See Table A4 and/or Table A17 for estimates of nonmarketed renewable energy consumption for geothermal heat pumps, solar thermal water heating, and electricity generation from wind and solar photovoltaic sources.
[3]Includes ethanol and ethers blended into gasoline.
[4]Excludes ethanol. Includes commercial sector consumption of wood and wood waste, landfill gas, municipal waste, and other biomass for combined heat and power. See Table A5 and/or Table A17 for estimates of nonmarketed renewable energy consumption for solar thermal water heating and electricity generation from wind and solar photovoltaic sources.
[5]Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems.
[6]Includes ethane, natural gasoline, and refinery olefins.
[7]Includes petroleum coke, asphalt, road oil, lubricants, still gas, and miscellaneous petroleum products.
[8]Represents natural gas used in well, field, and lease operations, and in natural gas processing plant machinery.
[9]Fuel used in facilities that liquefy natural gas for export.
[10]Includes consumption of energy produced from hydroelectric, wood and wood waste, municipal waste, and other biomass sources. Excludes ethanol in motor gasoline.
[11]E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). To address cold starting issues, the percentage of ethanol varies seasonally. The annual average ethanol content of 74 percent is used for these projections.
[12]Includes only kerosene type.
[13]Diesel fuel for on- and off- road use.
[14]Includes aviation gasoline and lubricants.
[15]Represents consumption unattributed to the sectors above.
[16]Includes aviation gasoline, petroleum coke, asphalt, road oil, lubricants, still gas, and miscellaneous petroleum products.
[17]Does not include residential use of kerosene.
[18]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.
[19]Includes consumption of energy by electricity-only and combined heat and power plants that have a regulatory status.
[20]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.
[21]Includes conventional hydroelectric, geothermal, wood and wood waste, biogenic municipal waste, other biomass, wind, photovoltaic, and solar thermal sources. Excludes net electricity imports.
[22]Includes conventional hydroelectric, geothermal, wood and wood waste, biogenic municipal waste, other biomass, wind, photovoltaic, and solar thermal sources. Excludes ethanol, net electricity imports, and nonmarketed renewable energy consumption for geothermal heat pumps, buildings photovoltaic systems, and solar thermal water heaters.
Btu = British thermal unit.
Note: Includes estimated consumption for petroleum and other liquids. Totals may not equal sum of components due to independent rounding. Data for 2020 are model results and may differ from official EIA data reports.
Sources: 2020: Energy Information Administration (EIA), *Short-Term Energy Outlook*, October 2020 and EIA, AEO2021 National Energy Modeling System run ref2021.d113020a. **Projections:** EIA, AEO2021 National Energy Modeling System runs hirencst.d113020a, ref2021.d113020a, and lowrencst.d113020a.

Table E3. Energy prices by sector and source

(2020 dollars per million Btu, unless otherwise noted)

Sector and source	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Residential										
Propane	17.30	21.39	21.30	21.48	24.08	24.16	24.33	26.24	26.16	26.64
Distillate fuel oil	17.75	24.74	24.85	24.76	26.55	26.68	26.56	27.99	27.80	27.97
Natural gas	10.14	11.05	10.99	10.92	11.49	11.44	11.37	11.92	11.76	11.54
Electricity	35.77	36.77	36.54	36.08	36.74	36.14	35.57	36.09	34.96	33.81
Commercial										
Propane	12.77	17.41	17.34	17.48	19.23	19.30	19.40	20.69	20.63	21.02
Distillate fuel oil	17.83	20.10	20.21	20.12	21.97	22.10	21.97	23.45	23.27	23.44
Residual fuel oil	5.25	11.22	11.26	11.23	13.18	13.35	13.20	14.59	14.49	14.55
Natural gas	7.23	8.25	8.20	8.13	8.49	8.45	8.38	8.83	8.69	8.48
Electricity	31.33	30.97	30.75	30.36	30.19	29.63	29.26	28.92	27.80	27.00
Industrial[1]										
Propane	7.62	11.92	11.85	11.99	13.74	13.83	13.92	15.29	15.24	15.66
Distillate fuel oil	17.75	19.85	19.96	19.87	21.68	21.81	21.68	23.20	23.01	23.18
Residual fuel oil	5.42	13.14	13.19	13.15	14.99	15.14	15.01	16.53	16.42	16.47
Natural gas[2]	3.06	4.27	4.20	4.08	4.46	4.36	4.25	4.71	4.48	4.22
Metallurgical coal	4.02	3.10	3.11	3.09	3.44	3.45	3.42	3.84	3.83	3.79
Other industrial coal	2.82	2.87	2.87	2.86	2.90	2.90	2.88	2.98	2.96	2.93
Coal to liquids	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Electricity	20.71	19.73	19.56	19.21	19.39	18.98	18.51	18.90	18.06	17.18
Transportation										
Propane	11.99	16.41	16.35	16.47	17.94	18.01	18.08	19.14	19.10	19.43
E85[3]	21.06	27.05	27.14	27.08	30.25	30.51	30.26	31.97	31.85	32.00
Motor gasoline[4]	18.75	23.23	23.28	23.26	25.77	25.94	25.78	27.14	26.99	27.16
Jet fuel[5]	9.57	16.37	16.44	16.37	18.82	18.93	18.78	20.72	20.52	20.63
Diesel fuel (distillate fuel oil)[6]	18.33	24.02	23.95	24.04	25.73	25.75	25.72	27.32	26.90	27.25
Residual fuel oil	9.21	12.57	11.72	12.56	14.08	14.33	14.01	16.36	16.23	16.29
Natural gas[7]	13.01	13.12	12.76	12.93	11.68	11.58	11.52	11.56	11.35	11.10
Electricity	34.84	35.00	34.84	34.50	34.88	34.53	34.56	33.17	32.72	32.35
Electric power[8]										
Distillate fuel oil	17.71	19.03	19.12	19.09	20.98	21.08	20.98	22.59	22.38	22.71
Residual fuel oil	8.29	14.61	14.67	14.61	16.26	16.38	16.24	17.04	16.94	16.98
Natural gas	2.45	3.72	3.61	3.45	4.01	3.77	3.58	4.25	3.90	3.53
Steam coal	1.96	1.84	1.83	1.81	1.83	1.81	1.78	1.84	1.79	1.73
Uranium	0.69	0.70	0.70	0.70	0.72	0.72	0.72	0.74	0.74	0.74
Average price to all users[9]										
Propane										
E85[3]	14.35	18.04	17.97	18.12	20.03	20.11	20.24	21.54	21.47	21.91
Motor gasoline[4]	21.06	27.05	27.14	27.08	30.25	30.51	30.26	31.97	31.85	32.00
Jet fuel[5]	18.74	23.24	23.28	23.27	25.78	25.94	25.78	27.15	27.00	27.17
Distillate fuel oil	9.57	16.37	16.44	16.37	18.82	18.93	18.78	20.72	20.52	20.63
Residual fuel oil	18.18	23.01	23.11	23.02	24.70	24.83	24.71	26.10	25.92	26.08
Natural gas	8.84	12.69	11.94	12.69	14.23	14.47	14.16	16.38	16.26	16.31
Metallurgical coal	4.53	5.73	5.70	5.65	5.87	5.85	5.82	6.01	5.90	5.79
Other coal	4.02	3.10	3.11	3.09	3.44	3.45	3.42	3.84	3.83	3.79
Coal to liquids	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Electricity	30.53	30.34	30.13	29.72	30.04	29.52	29.05	29.27	28.24	27.30
Non-renewable energy expenditures by sector (billion 2020 dollars)										
Residential	247	266	265	263	282	279	276	297	291	284
Commercial	173	196	195	192	204	201	195	218	210	199
Industrial[1]	152	216	215	213	252	250	248	292	285	281
Transportation	412	558	558	558	611	614	610	676	671	674
Total non-renewable expenditures	984	1,235	1,232	1,226	1,350	1,345	1,330	1,483	1,458	1,439
Transportation renewable expenditures	1	1	1	1	1	1	1	1	1	1
Total expenditures	**985**	**1,236**	**1,233**	**1,226**	**1,351**	**1,345**	**1,331**	**1,484**	**1,459**	**1,439**

Table E3. Energy prices by sector and source (continued)

(nominal dollars per million Btu, unless otherwise noted)

Sector and source	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Residential										
Propane	17.30	26.11	26.00	26.20	36.68	36.74	37.00	51.43	51.08	52.08
Distillate fuel oil	17.75	30.21	30.32	30.21	40.45	40.58	40.38	54.87	54.29	54.68
Natural gas	10.14	13.49	13.41	13.32	17.50	17.40	17.29	23.36	22.96	22.57
Electricity	35.77	44.89	44.59	44.01	55.97	54.96	54.09	70.75	68.26	66.10
Commercial										
Propane	12.77	21.26	21.16	21.32	29.29	29.36	29.50	40.55	40.29	41.09
Distillate fuel oil	17.83	24.55	24.66	24.55	33.47	33.61	33.41	45.97	45.44	45.83
Residual fuel oil	5.25	13.69	13.74	13.70	20.08	20.31	20.06	28.61	28.29	28.44
Natural gas	7.23	10.07	10.00	9.91	12.94	12.85	12.75	17.31	16.96	16.58
Electricity	31.33	37.81	37.52	37.03	45.99	45.07	44.48	56.68	54.28	52.80
Industrial[1]										
Propane	7.62	14.55	14.46	14.62	20.94	21.03	21.17	29.98	29.75	30.61
Distillate fuel oil	17.75	24.24	24.35	24.24	33.02	33.17	32.97	45.47	44.94	45.32
Residual fuel oil	5.42	16.04	16.10	16.04	22.84	23.02	22.82	32.40	32.06	32.21
Natural gas[2]	3.06	5.22	5.12	4.98	6.80	6.64	6.47	9.23	8.75	8.24
Metallurgical coal	4.02	3.78	3.80	3.77	5.23	5.24	5.20	7.53	7.49	7.40
Other industrial coal	2.82	3.50	3.50	3.49	4.42	4.41	4.38	5.85	5.79	5.73
Coal to liquids	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Electricity	20.71	24.09	23.87	23.43	29.54	28.86	28.14	37.04	35.26	33.58
Transportation										
Propane	11.99	20.03	19.95	20.09	27.33	27.39	27.50	37.52	37.29	37.98
E85[3]	21.06	33.02	33.12	33.04	46.08	46.40	46.00	62.66	62.20	62.56
Motor gasoline[4]	18.75	28.36	28.40	28.38	39.26	39.44	39.19	53.19	52.70	53.10
Jet fuel[5]	9.57	19.98	20.07	19.97	28.66	28.79	28.56	40.61	40.06	40.34
Diesel fuel (distillate fuel oil)[6]	18.33	29.32	29.22	29.32	39.19	39.16	39.11	53.56	52.53	53.27
Residual fuel oil	9.21	15.34	14.30	15.33	21.45	21.80	21.30	32.06	31.69	31.84
Natural gas[7]	13.01	16.02	15.57	15.77	17.80	17.61	17.51	22.66	22.16	21.70
Electricity	34.84	42.73	42.52	42.08	53.13	52.51	52.54	65.02	63.89	63.25
Electric power[8]										
Distillate fuel oil	17.71	23.24	23.34	23.29	31.96	32.07	31.90	44.28	43.71	44.40
Residual fuel oil	8.29	17.83	17.91	17.82	24.76	24.91	24.69	33.40	33.08	33.21
Natural gas	2.45	4.54	4.41	4.21	6.10	5.74	5.44	8.34	7.62	6.90
Steam coal	1.96	2.25	2.23	2.21	2.78	2.75	2.71	3.61	3.49	3.38
Uranium	0.69	0.86	0.86	0.86	1.09	1.09	1.09	1.45	1.44	1.44

Table E3. Energy prices by sector and source (continued)

(nominal dollars per million Btu, unless otherwise noted)

Sector and source	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Average price to all users[9]										
Propane	14.35	22.02	21.92	22.11	30.51	30.58	30.77	42.22	41.93	42.83
E85[3]	21.06	33.02	33.12	33.04	46.08	46.40	46.00	62.66	62.20	62.56
Motor gasoline[4]	18.74	28.37	28.41	28.39	39.27	39.46	39.21	53.21	52.71	53.12
Jet fuel[5]	9.57	19.98	20.07	19.97	28.66	28.79	28.56	40.61	40.06	40.34
Distillate fuel oil	18.18	28.09	28.20	28.08	37.62	37.76	37.57	51.16	50.61	51.00
Residual fuel oil	8.84	15.50	14.57	15.48	21.68	22.01	21.53	32.11	31.74	31.89
Natural gas	4.53	7.00	6.96	6.89	8.95	8.90	8.86	11.77	11.53	11.33
Metallurgical coal	4.02	3.78	3.80	3.77	5.23	5.24	5.20	7.53	7.49	7.40
Other coal	2.02	2.34	2.33	2.31	2.90	2.88	2.84	3.79	3.69	3.62
Coal to liquids	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Electricity	30.53	37.04	36.76	36.26	45.76	44.89	44.17	57.36	55.14	53.37
Non-renewable energy expenditures by sector (billion nominal dollars)										
Residential	247	325	323	320	429	425	420	582	569	555
Commercial	173	239	238	234	311	305	297	427	411	390
Industrial[1]	152	264	262	260	384	381	377	573	557	550
Transportation	412	681	681	680	931	934	928	1,325	1,311	1,317
Total non-renewable expenditures	984	1,508	1,504	1,495	2,056	2,045	2,022	2,907	2,847	2,813
Transportation renewable expenditures	1	1	1	1	1	1	1	2	2	2
Total expenditures	**985**	**1,509**	**1,505**	**1,496**	**2,057**	**2,046**	**2,023**	**2,909**	**2,849**	**2,814**

[1]Includes energy for combined heat and power plants that have a non-regulatory status, and small on-site generating systems.
[2]Excludes use for lease and plant fuel and fuel used for liquefaction in export facilities.
[3]E85 refers to a blend of 85 percent ethanol (renewable) and 15 percent motor gasoline (nonrenewable). To address cold starting issues, the percentage of ethanol varies seasonally. The annual average ethanol content of 74 percent is used for these projections.
[4]Sales weighted-average price for all grades. Includes Federal, State, and local taxes.
[5]Kerosene-type jet fuel. Includes Federal and State taxes while excluding county and local taxes.
[6]Diesel fuel for on-road use. Includes Federal and State taxes while excluding county and local taxes.
[7]Natural gas used as fuel in motor vehicles, trains, and ships. Includes estimated motor vehicle fuel taxes and estimated dispensing costs or charges.
[8]Includes electricity-only and combined heat and power plants that have a regulatory status.
[9]Weighted averages of end-use fuel prices are derived from the prices shown in each sector and the corresponding sectoral consumption.
Btu = British thermal unit.
- - = Not applicable.
Note: Data for 2020 are model results and may differ from official EIA data reports.
Sources: 2020: Energy Information Administration (EIA), *Short-Term Energy Outlook*, October 2020 and EIA, AEO2021 National Energy Modeling System run ref2021.d113020a. **Projections:** EIA, AEO2021 National Energy Modeling System runs hirencst.d113020a, ref2021.d113020a, and lowrencst.d113020a.

Table E4. Electricity supply, disposition, prices, and emissions
(billion kilowatthours, unless otherwise noted)

Supply, disposition, prices, and emissions	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Net generation by fuel type										
Electric power sector[1]										
Power only[2]										
Coal	756	690	679	639	628	603	563	608	577	463
Petroleum	14	8	8	8	7	6	6	5	5	4
Natural gas[3]	1,390	1,419	1,304	1,181	1,689	1,424	1,200	2,064	1,629	1,214
Nuclear power	785	630	630	608	611	595	533	618	594	356
Pumped storage/other[4]	1	0	0	-1	0	-1	-4	-1	-3	-17
Renewable sources[5]	751	1,292	1,421	1,609	1,411	1,725	2,033	1,501	2,023	2,765
Distributed generation (natural gas)	0	3	3	3	8	7	7	17	14	13
Total power only	**3,697**	**4,042**	**4,045**	**4,047**	**4,354**	**4,360**	**4,338**	**4,812**	**4,839**	**4,798**
Combined heat and power[6]										
Coal	10	10	10	10	10	10	10	10	10	10
Petroleum	1	1	1	1	1	1	1	1	1	1
Natural gas	132	122	123	123	121	123	124	121	123	123
Renewable sources	4	4	4	4	4	4	5	4	5	5
Other	0	0	0	0	0	0	0	0	0	0
Total combined heat and power	**147**	**137**	**138**	**138**	**136**	**138**	**139**	**136**	**138**	**138**
Total electric power sector net generation	**3,844**	**4,179**	**4,183**	**4,185**	**4,490**	**4,498**	**4,477**	**4,949**	**4,978**	**4,936**
Less direct use	15	14	14	14	14	14	14	14	14	14
Net available to the grid	**3,829**	**4,165**	**4,169**	**4,171**	**4,476**	**4,484**	**4,463**	**4,935**	**4,964**	**4,922**
End-use sector[7]										
Coal	7	7	7	7	7	7	7	7	7	7
Petroleum	1	1	1	1	1	1	1	1	1	1
Natural gas	115	133	132	132	153	152	151	191	186	181
Other gaseous fuels[8]	12	13	13	13	13	13	13	13	13	13
Renewable sources[9]	79	135	136	143	190	197	236	257	270	357
Other[10]	3	3	3	3	3	3	3	3	3	3
Total end-use sector net generation	**217**	**291**	**292**	**299**	**367**	**373**	**410**	**471**	**480**	**562**
Less direct use	162	233	234	241	293	299	336	373	383	462
Total sales to the grid	**55**	**58**	**58**	**58**	**74**	**74**	**75**	**98**	**97**	**100**
Total net electricity generation by fuel										
Coal	774	707	696	656	645	620	579	624	593	480
Petroleum	16	9	9	9	8	8	7	6	6	6
Natural gas	1,636	1,676	1,562	1,439	1,972	1,706	1,481	2,394	1,953	1,531
Nuclear power	785	630	630	608	611	595	533	618	594	356
Renewable sources[5,9]	834	1,431	1,562	1,757	1,606	1,927	2,273	1,763	2,298	3,126
Other[11]	16	16	16	16	16	15	13	16	14	-1
Total net electricity generation	**4,061**	**4,471**	**4,475**	**4,484**	**4,858**	**4,871**	**4,887**	**5,420**	**5,458**	**5,497**
Net generation to the grid	**3,884**	**4,223**	**4,227**	**4,229**	**4,551**	**4,558**	**4,538**	**5,034**	**5,061**	**5,022**
Net imports	**46**	**51**	**52**	**52**	**50**	**49**	**45**	**47**	**44**	**34**
Electricity sales by sector										
Residential	1,481	1,539	1,541	1,546	1,656	1,663	1,667	1,793	1,811	1,816
Commercial	1,271	1,395	1,395	1,391	1,480	1,476	1,443	1,655	1,649	1,583
Industrial	899	1,029	1,030	1,031	1,092	1,093	1,095	1,170	1,178	1,184
Transportation	10	29	29	29	66	66	66	120	121	122
Total	**3,661**	**3,992**	**3,995**	**3,997**	**4,293**	**4,298**	**4,272**	**4,739**	**4,758**	**4,704**
Direct use	177	247	248	255	307	313	349	386	397	475
Total electricity use	**3,838**	**4,239**	**4,243**	**4,252**	**4,600**	**4,611**	**4,621**	**5,125**	**5,155**	**5,179**

Table E4. Electricity supply, disposition, prices, and emissions (continued)
(billion kilowatthours, unless otherwise noted)

Supply, disposition, prices, and emissions	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
End-use prices										
(2020 cents per kilowatthour)										
Residential	12.2	12.5	12.5	12.3	12.5	12.3	12.1	12.3	11.9	11.5
Commercial	10.7	10.6	10.5	10.4	10.3	10.1	10.0	9.9	9.5	9.2
Industrial	7.1	6.7	6.7	6.6	6.6	6.5	6.3	6.4	6.2	5.9
Transportation	11.9	11.9	11.9	11.8	11.9	11.8	11.8	11.3	11.2	11.0
All sectors average	**10.4**	**10.4**	**10.3**	**10.1**	**10.3**	**10.1**	**9.9**	**10.0**	**9.6**	**9.3**
(nominal cents per kilowatthour)										
Residential	12.2	15.3	15.2	15.0	19.1	18.8	18.5	24.1	23.3	22.6
Commercial	10.7	12.9	12.8	12.6	15.7	15.4	15.2	19.3	18.5	18.0
Industrial	7.1	8.2	8.1	8.0	10.1	9.8	9.6	12.6	12.0	11.5
Transportation	11.9	14.6	14.5	14.4	18.1	17.9	17.9	22.2	21.8	21.6
All sectors average	**10.4**	**12.6**	**12.5**	**12.4**	**15.6**	**15.3**	**15.1**	**19.6**	**18.8**	**18.2**
Prices by service category										
(2020 cents per kilowatthour)										
Generation	5.8	5.5	5.4	5.3	5.2	5.0	4.8	5.1	4.7	4.2
Transmission	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.5	1.5	1.6
Distribution	3.3	3.3	3.3	3.3	3.5	3.5	3.5	3.4	3.4	3.4
(nominal cents per kilowatthour)										
Generation	5.8	6.7	6.6	6.4	7.9	7.6	7.3	9.9	9.1	8.3
Transmission	1.4	1.8	1.8	1.9	2.4	2.4	2.4	3.0	3.0	3.2
Distribution	3.3	4.1	4.1	4.1	5.3	5.3	5.3	6.7	6.6	6.7
Electric power sector emissions[1]										
Sulfur dioxide (million short tons)	0.61	0.49	0.48	0.44	0.49	0.48	0.45	0.50	0.48	0.39
Nitrogen oxide (million short tons)	0.77	0.55	0.53	0.48	0.51	0.47	0.43	0.52	0.47	0.41
Mercury (short tons)	3.38	3.08	3.07	2.87	2.97	2.87	2.70	2.98	2.85	2.38

[1]Includes electricity-only and combined heat and power plants that have a regulatory status.
[2]Includes plants that only produce electricity and that have a regulatory status.
[3]Includes electricity generation from fuel cells.
[4]Includes non-biogenic municipal waste.
[5]Includes conventional hydroelectric, geothermal, wood, wood waste, biogenic municipal waste, landfill gas, other biomass, solar, and wind power in the electric power sector.
[6]Includes combined heat and power plants whose primary business is to sell electricity and heat to the public (i.e., those that report North American Industry Classification System code 22 or that have a regulatory status).
[7]Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors that have a non-regulatory status; and small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid.
[8]Includes refinery gas and still gas.
[9]Includes conventional hydroelectric, geothermal, wood, wood waste, all municipal waste, landfill gas, other biomass, solar, and wind power in the electric power sector.
[10]Includes batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.
[11]Includes pumped storage, non-biogenic municipal waste, refinery gas, still gas, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.
- - = Not applicable.
Note: Totals may not equal sum of components due to independent rounding. Data for 2020 are model results and may differ from official EIA data reports.
Sources: 2020: EIA, *Short-Term Energy Outlook*, October 2020 and EIA, AEO2021 National Energy Modeling System run ref2021.d113020a. **Projections**: EIA, AEO2021 National Energy Modeling System runs hirencst.d113020a, ref2021.d113020a, and lowrencst.d113020a.

Table E5. Electricity generating capacity
(gigawatts)

Net summer capacity[1]	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Electric power sector[2]										
Power only[3]										
Coal[4]	217.3	120.2	117.9	112.0	110.3	105.4	99.6	105.9	102.1	92.7
Oil and natural gas steam[4,5]	72.6	47.4	47.0	45.2	42.6	43.4	41.1	43.5	43.3	35.7
Combined cycle	245.4	324.5	308.4	299.0	387.9	348.0	316.9	474.2	394.7	342.5
Combustion turbine/diesel	140.0	199.8	197.2	194.6	240.3	239.1	226.4	290.1	304.3	281.7
Nuclear power[6]	97.1	76.9	76.9	74.2	74.5	72.4	64.9	75.3	72.3	43.5
Pumped storage	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8
Diurnal storage	3.2	12.7	12.8	14.5	15.9	16.4	26.5	16.1	20.6	90.0
Fuel cells	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Renewable sources[7]	263.9	422.2	476.2	547.4	451.3	576.0	702.0	476.3	688.2	970.0
Distributed generation (natural gas)[8]	0.0	6.6	5.8	5.9	18.5	16.1	15.3	38.7	33.0	30.2
Total	**1,062.6**	**1,233.4**	**1,265.2**	**1,315.9**	**1,364.3**	**1,440.0**	**1,515.6**	**1,543.1**	**1,681.5**	**1,909.3**
Combined heat and power[9]										
Coal	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Oil and natural gas steam[5]	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Combined cycle	22.0	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8
Combustion turbine/diesel	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Renewable sources[7]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total combined heat and power	**28.6**	**28.3**	**28.3**	**28.3**	**28.3**	**28.3**	**28.3**	**28.3**	**28.3**	**28.3**
Cumulative planned additions[10]										
Coal	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oil and natural gas steam[5]	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combined cycle	- -	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Combustion turbine/diesel	- -	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Nuclear power	- -	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Pumped storage	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diurnal storage	- -	9.5	9.5	9.5	12.7	12.7	12.7	13.0	13.0	13.0
Fuel cells	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewable sources[7]	- -	42.5	42.5	42.5	55.9	55.9	55.9	55.9	55.9	55.9
Distributed generation[8]	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total planned additions	**- -**	**75.8**	**75.8**	**75.8**	**92.4**	**92.4**	**92.4**	**92.7**	**92.7**	**92.7**
Cumulative unplanned additions[10]										
Coal	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oil and natural gas steam[5]	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combined cycle	- -	68.6	52.4	43.1	134.4	94.7	63.1	222.7	144.2	92.2
Combustion turbine/diesel	- -	58.7	55.5	53.1	99.4	97.7	85.1	149.5	163.2	141.2
Nuclear power	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pumped storage	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diurnal storage	- -	0.0	0.1	1.9	0.0	0.6	10.6	0.0	4.5	73.9
Fuel cells	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewable sources[7]	- -	116.1	170.1	241.3	131.8	256.5	382.5	156.9	368.8	650.6
Distributed generation[8]	- -	6.6	5.8	5.9	18.5	16.1	15.3	38.7	33.0	30.2
Total unplanned additions	**- -**	**250.0**	**283.9**	**345.3**	**384.1**	**465.6**	**556.6**	**567.9**	**713.7**	**988.1**
Cumulative electric power sector additions[10]	**- -**	**325.8**	**359.7**	**421.1**	**476.5**	**558.0**	**649.0**	**660.5**	**806.3**	**1,080.7**
Cumulative retirements[11]										
Coal	- -	93.8	96.1	101.7	103.8	107.8	113.3	107.4	111.1	120.2
Oil and natural gas steam[5]	- -	28.6	29.0	31.1	33.4	33.4	36.1	33.4	33.5	41.4
Combined cycle	- -	6.7	6.6	6.7	9.1	9.3	8.8	11.1	12.1	12.3
Combustion turbine/diesel	- -	3.4	2.9	3.1	3.6	3.1	3.2	4.0	3.5	4.0
Nuclear power	- -	22.9	22.9	25.5	26.1	28.1	35.6	26.1	29.1	57.9
Pumped storage	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diurnal storage	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel cells	- -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewable sources[7]	- -	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
Total retirements	**- -**	**155.7**	**157.8**	**168.4**	**176.3**	**182.1**	**197.5**	**182.3**	**189.7**	**236.3**
Total electric power sector capacity	**1,091.2**	**1,261.7**	**1,293.5**	**1,344.2**	**1,392.6**	**1,468.3**	**1,543.9**	**1,571.5**	**1,709.9**	**1,937.7**

Table E5. Electricity generating capacity (continued)
(gigawatts)

Net summer capacity[1]	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
End-use generators[12]										
Coal	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8
Petroleum	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Natural gas	17.8	21.2	21.2	21.1	24.8	24.7	24.4	31.7	30.8	29.9
Other gaseous fuels[13]	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Renewable sources[7]	40.2	79.9	80.6	86.1	117.7	123.1	153.0	162.0	172.7	238.5
Other[14]	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total end-use generators	**64.0**	**107.1**	**107.8**	**113.3**	**148.6**	**153.7**	**183.4**	**199.6**	**209.5**	**274.3**
Cumulative end-use capacity additions[10]	**- -**	**43.3**	**43.9**	**49.3**	**84.9**	**90.0**	**119.5**	**136.0**	**145.8**	**210.4**

[1]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.
[2]Includes electricity-only and combined heat and power plants that have a regulatory status.
[3]Includes plants that only produce electricity and that have a regulatory status. Includes capacity increases (uprates) at existing units.
[4]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. No planned conversions are assumed. The totals may reflect any conversions projected by the model.
[5]Includes oil-, gas-, and dual-fired capacity.
[6]Nuclear capacity includes 2.1 gigawatts of uprates.
[7]Includes conventional hydroelectric, geothermal, wood, wood waste, all municipal waste, landfill gas, other biomass, solar, and wind power in the electric power sector. Facilities co-firing biomass and coal are classified as coal.
[8]Primarily peak load capacity fueled by natural gas.
[9]Includes combined heat and power plants whose primary business is to sell electricity and heat to the public (i.e., those that report North American Industry Classification System code 22 or that have a regulatory status).
[10]Cumulative additions after December 31, 2020.
[11]Cumulative retirements after December 31, 2020.
[12]Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors that have a non-regulatory status; and small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid.
[13]Includes refinery gas and still gas.
[14]Includes batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.
- - = Not applicable.
Note: Totals may not equal sum of components due to independent rounding. Data for 2020 are model results and may differ from official EIA data reports.
Sources: 2020 capacity and projected planned additions: U.S. Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report" (preliminary). 2020: EIA, *Short-Term Energy Outlook*, October 2020 and EIA, AEO2021 National Energy Modeling System run ref2021.d113020a. **Projections:** EIA, AEO2021 National Energy Modeling System runs hirencst.d113020a, ref2021.d113020a, and lowrencst.d113020a.

Table E6. Renewable energy generating capacity and generation
(gigawatts, unless otherwise noted)

Net summer capacity[1]	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Electric power sector[1]										
Net summer capacity										
Conventional hydroelectric power	79.2	79.3	79.3	79.3	79.3	79.3	79.4	79.3	79.3	79.9
Geothermal[2]	2.5	3.9	3.6	3.6	5.3	5.4	5.7	6.4	6.7	7.6
Municipal waste[3]	3.5	4.6	4.6	4.6	5.9	5.9	5.9	6.8	6.8	6.8
Wood and other biomass[4]	3.0	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.5
Solar thermal	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Solar photovoltaic[5]	48.5	117.0	175.4	243.1	124.1	253.8	363.4	132.9	351.3	508.2
Wind	126.5	203.8	199.5	203.0	209.5	204.5	220.5	223.7	217.0	339.9
Offshore wind	0.0	10.0	10.0	10.0	23.4	23.4	23.4	23.4	23.4	23.4
Total electric power sector capacity	**264.9**	**423.2**	**477.2**	**548.3**	**452.3**	**577.0**	**703.0**	**477.3**	**689.2**	**971.0**
Generation (billion kilowatthours)										
Conventional hydroelectric power	281.9	294.2	294.0	293.9	294.0	293.2	293.5	293.8	292.3	292.8
Geothermal[2]	15.6	27.2	25.3	25.2	38.5	39.5	41.6	47.1	49.8	56.8
Biogenic municipal waste[6]	18.2	28.1	28.5	28.7	39.2	39.9	41.2	47.5	49.1	50.5
Wood and other biomass	12.3	12.0	11.9	11.9	12.0	12.0	11.9	12.2	12.1	13.7
Dedicated plants	12.1	11.9	11.7	11.8	11.9	11.9	11.8	12.0	11.9	13.5
Cofiring	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Solar thermal	3.3	3.0	3.1	3.2	3.0	2.7	2.9	2.9	3.1	2.7
Solar photovoltaic[5]	81.9	245.4	390.4	563.2	263.2	595.7	843.3	286.7	832.4	1,166.3
Wind	342.0	651.0	637.4	652.0	671.6	652.8	709.1	721.4	695.1	1,093.1
Offshore wind	0.1	35.1	35.2	35.4	94.3	94.1	93.8	94.2	93.8	93.3
Total electric power sector generation	**755.4**	**1,296.1**	**1,425.8**	**1,613.5**	**1,415.8**	**1,729.8**	**2,037.2**	**1,505.8**	**2,027.7**	**2,769.2**
End-use sectors[7]										
Net summer capacity										
Conventional hydroelectric power	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Municipal waste[8]	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Biomass	4.7	5.0	5.0	5.0	5.1	5.1	5.1	5.3	5.3	5.3
Solar photovoltaic[5]	34.2	73.6	74.3	79.8	111.4	116.7	146.6	155.4	166.1	231.7
Wind	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.8
Total end-use sector capacity	**40.2**	**79.9**	**80.6**	**86.1**	**117.7**	**123.1**	**153.0**	**162.0**	**172.7**	**238.5**
Generation (billion kilowatthours)										
Conventional hydroelectric power	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Municipal waste[8]	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Biomass	26.1	27.7	27.7	27.7	28.2	28.2	28.2	29.4	29.3	29.3
Solar photovoltaic[5]	47.3	102.2	103.1	110.1	156.7	163.5	202.2	221.9	235.4	321.6
Wind	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	1.1
Total end-use sector generation	**78.8**	**135.3**	**136.2**	**143.2**	**190.3**	**197.1**	**235.9**	**256.8**	**270.2**	**356.7**

Table E6. Renewable energy generating capacity and generation (continued)
(gigawatts, unless otherwise noted)

Net summer capacity and generation	2020	Projections								
		2030			2040			2050		
		High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost	High renewable cost	Reference	Low renewable cost
Total, all sectors										
Net summer capacity										
Conventional hydroelectric power	79.4	79.6	79.6	79.6	79.6	79.6	79.7	79.6	79.6	80.1
Geothermal	2.5	3.9	3.6	3.6	5.3	5.4	5.7	6.4	6.7	7.6
Municipal waste	3.9	5.1	5.1	5.1	6.4	6.4	6.4	7.3	7.3	7.3
Wood and other biomass[4]	7.7	7.9	7.9	7.9	8.0	8.0	8.0	8.2	8.2	8.8
Solar[5]	84.5	192.3	251.5	324.7	237.2	372.3	511.7	290.1	519.1	741.6
Wind	127.1	214.4	210.1	213.6	233.5	228.5	244.6	247.8	241.0	364.1
Total capacity, all sectors	**305.1**	**503.1**	**557.8**	**634.4**	**570.0**	**700.1**	**856.0**	**639.3**	**861.9**	**1,209.5**
Generation (billion kilowatthours)										
Conventional hydroelectric power	283.2	295.4	295.2	295.1	295.2	294.4	294.7	295.0	293.5	294.1
Geothermal	15.6	27.2	25.3	25.2	38.5	39.5	41.6	47.1	49.8	56.8
Municipal waste	21.7	31.5	31.9	32.1	42.7	43.3	44.6	50.9	52.5	53.9
Wood and other biomass	38.4	39.7	39.6	39.6	40.2	40.2	40.1	41.6	41.4	43.0
Solar[5]	132.4	350.6	496.6	676.5	422.9	761.9	1,048.3	511.6	1,070.9	1,490.7
Wind	342.9	686.9	673.4	688.3	766.7	747.6	803.9	816.5	789.7	1,187.4
Total generation, all sectors	**834.1**	**1,431.4**	**1,562.1**	**1,756.7**	**1,606.2**	**1,926.9**	**2,273.1**	**1,762.6**	**2,297.8**	**3,125.9**

[1]Includes electricity-only and combined heat and power plants that have a regulatory status.
[2]Includes both hydrothermal resources (hot water and steam) and near-field enhanced geothermal systems (EGS). Near-field EGS potential occurs on known hydrothermal sites, however this potential requires the addition of external fluids for electricity generation and is only available after 2025.
[3]Includes municipal waste, landfill gas, and municipal sewage sludge. Incremental growth is assumed to be for landfill gas facilities. All municipal waste is included, although a portion of the municipal waste stream contains petroleum-derived plastics and other non-renewable sources.
[4]Facilities co-firing biomass and coal are classified as coal.
[5]Does not include off-grid photovoltaics.
[6]Includes biogenic municipal waste, landfill gas, and municipal sewage sludge. Incremental growth is assumed to be for landfill gas facilities.
[7]Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors that have a non-regulatory status; and small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid.
[8]Includes municipal waste, landfill gas, and municipal sewage sludge. All municipal waste is included, although a portion of the municipal waste stream contains petroleum-derived plastics and other non-renewable sources.
- - = Not applicable.
Note: Totals may not equal sum of components due to independent rounding. Data for 2020 are model results and may differ from official EIA data reports.
Sources: 2020: EIA, *Short-Term Energy Outlook*, October 2020 and EIA, AEO2021 National Energy Modeling System run ref2021.d113020a. **Projections:** EIA, AEO2021 National Energy Modeling System runs hirencst.d113020a, ref2021.d113020a, and lowrencst.d113020a.