

Appendix F

Results from Side Cases

Table F1. Key Results for Residential and Commercial Sector Technology Cases

Energy Consumption	2002	2010				2015			
		2004 Technology	Reference Case	High Technology	Best Available Technology	2004 Technology	Reference Case	High Technology	Best Available Technology
Residential									
Energy Consumption (quadrillion Btu)									
Distillate Fuel	0.89	0.94	0.93	0.92	0.89	0.91	0.89	0.88	0.83
Kerosene	0.07	0.11	0.11	0.11	0.10	0.11	0.11	0.11	0.10
Liquefied Petroleum Gas	0.53	0.56	0.56	0.55	0.52	0.60	0.59	0.57	0.51
Petroleum Subtotal	1.48	1.62	1.60	1.59	1.51	1.62	1.59	1.55	1.44
Natural Gas	5.06	5.72	5.69	5.67	5.07	5.90	5.84	5.74	4.78
Coal	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Renewable Energy	0.39	0.41	0.40	0.40	0.40	0.41	0.41	0.40	0.39
Electricity	4.33	4.90	4.87	4.80	4.53	5.28	5.22	5.06	4.56
Delivered Energy	11.28	12.66	12.58	12.48	11.52	13.22	13.06	12.76	11.18
Electricity Related Losses	9.60	10.54	10.48	10.33	9.74	11.03	10.91	10.56	9.53
Total	20.88	23.21	23.05	22.80	21.26	24.25	23.98	23.32	20.71
Delivered Energy Consumption per Household (million Btu per household)									
	102.3	105.7	105.0	104.1	96.1	104.8	103.6	101.2	88.7
Non-Marketed Renewables Consumption (quadrillion Btu)									
	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03
Commercial									
Energy Consumption (quadrillion Btu)									
Distillate Fuel	0.49	0.63	0.62	0.62	0.61	0.66	0.65	0.65	0.64
Residual Fuel	0.08	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Kerosene	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Liquefied Petroleum Gas	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Motor Gasoline	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Petroleum Subtotal	0.72	0.92	0.92	0.91	0.91	0.96	0.95	0.94	0.94
Natural Gas	3.21	3.59	3.57	3.56	3.48	3.74	3.72	3.71	3.60
Coal	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Renewable Energy	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Electricity	4.12	5.10	5.05	4.97	4.53	5.76	5.64	5.48	4.84
Delivered Energy	8.25	9.81	9.74	9.64	9.12	10.66	10.51	10.32	9.57
Electricity Related Losses	9.15	10.98	10.86	10.69	9.74	12.03	11.78	11.44	10.12
Total	17.40	20.79	20.60	20.33	18.86	22.69	22.29	21.76	19.69
Delivered Energy Consumption per Square Foot (thousand Btu per square foot)									
	114.5	117.1	116.2	115.0	108.8	118.5	116.9	114.8	106.4
Net Summer Generation Capacity (megawatts)									
Natural Gas	617	703	765	774	786	758	967	1038	1147
Solar Photovoltaic	35	258	258	285	297	284	284	452	650
Generation (billion kilowatthours)									
Natural Gas	4.45	5.06	5.51	5.58	5.66	5.46	6.98	7.50	8.29
Solar Photovoltaic	0.07	0.55	0.55	0.60	0.63	0.60	0.60	0.97	1.39
Non-Marketed Renewables (quadrillion Btu)									
	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Btu = British thermal unit.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports. Side cases were run without the fully integrated modeling system, so not all feedbacks are captured. The reference case ratio of electricity losses to electricity use was used to compute electricity losses for the technology cases.

Source: Energy Information Administration, AEO2004 National Energy Modeling System, runs BLDFRZN.D102303D, BLDDEF.D102303A, BLDHIGH.D102303D, and BLDBEST.D102303D

Results from Side Cases

2020				2025				Annual Growth 2002-2025			
2004 Technology	Reference Case	High Technology	Best Available Technology	2004 Technology	Reference Case	High Technology	Best Available Technology	2004 Technology	Reference Case	High Technology	Best Available Technology
0.88	0.85	0.83	0.76	0.84	0.80	0.78	0.70	-0.3%	-0.5%	-0.6%	-1.1%
0.10	0.10	0.10	0.08	0.09	0.09	0.09	0.07	1.4%	1.3%	1.2%	0.3%
0.63	0.61	0.58	0.52	0.66	0.64	0.60	0.54	1.0%	0.8%	0.6%	0.1%
1.61	1.56	1.51	1.37	1.59	1.53	1.46	1.31	0.3%	0.1%	-0.1%	-0.5%
6.17	6.08	5.92	4.81	6.37	6.27	6.04	4.87	1.0%	0.9%	0.8%	-0.2%
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.1%	-0.3%	-0.4%	-0.5%
0.42	0.41	0.39	0.39	0.42	0.41	0.39	0.38	0.3%	0.1%	-0.1%	-0.2%
5.66	5.60	5.34	4.66	6.06	5.96	5.64	4.85	1.5%	1.4%	1.2%	0.5%
13.87	13.66	13.18	11.23	14.45	14.17	13.54	11.42	1.1%	1.0%	0.8%	0.1%
11.56	11.43	10.91	9.51	12.15	11.94	11.31	9.73	1.0%	1.0%	0.7%	0.1%
25.43	25.10	24.09	20.74	26.60	26.11	24.85	21.15	1.1%	1.0%	0.8%	0.1%
105.0	103.5	99.8	85.1	104.9	102.8	98.3	82.9	0.1%	0.0%	-0.2%	-0.9%
0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.08	2.9%	3.2%	3.5%	5.2%
0.69	0.67	0.66	0.65	0.72	0.70	0.68	0.67	1.7%	1.6%	1.5%	1.4%
0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	2.2%	2.2%	2.2%	2.2%
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	1.4%	1.4%	1.4%	1.4%
0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.3%	0.3%	0.3%	0.3%
0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2%	0.2%	0.2%	0.2%
0.99	0.97	0.96	0.95	1.02	1.00	0.99	0.98	1.5%	1.4%	1.4%	1.3%
3.95	3.94	3.92	3.79	4.16	4.16	4.15	4.05	1.1%	1.1%	1.1%	1.0%
0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0%	0.0%	0.0%	0.0%
0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0%	0.0%	0.0%	0.0%
6.45	6.24	5.96	5.20	7.17	6.83	6.44	5.56	2.4%	2.2%	2.0%	1.3%
11.59	11.34	11.05	10.15	12.54	12.19	11.78	10.79	1.8%	1.7%	1.6%	1.2%
13.17	12.73	12.17	10.62	14.36	13.70	12.91	11.15	2.0%	1.8%	1.5%	0.9%
24.76	24.08	23.22	20.77	26.90	25.89	24.69	21.94	1.9%	1.7%	1.5%	1.0%
120.8	118.3	115.2	105.8	123.2	119.7	115.7	106.0	0.3%	0.2%	0.0%	-0.3%
806	1309	1521	1841	867	1919	2409	3822	1.5%	5.1%	6.1%	8.2%
311	434	890	1715	337	953	1800	3267	10.3%	15.4%	18.7%	21.8%
5.81	9.47	11.01	13.34	6.25	13.90	17.47	27.75	1.5%	5.1%	6.1%	8.3%
0.66	0.93	1.91	3.57	0.72	2.04	3.80	6.73	10.4%	15.5%	18.6%	21.6%
0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.05	1.1%	1.5%	2.1%	3.1%

Results from Side Cases

Table F2. Key Results for Industrial Sector Technology Cases

Consumption	2002	2010			2020			2025		
		2004 Technology	Reference Case	High Technology	2004 Technology	Reference Case	High Technology	2004 Technology	Reference Case	High Technology
Energy Consumption (quadrillion Btu)										
Distillate Fuel	1.16	1.19	1.17	1.16	1.39	1.34	1.29	1.49	1.43	1.37
Liquefied Petroleum Gas	2.22	2.40	2.35	2.32	2.85	2.74	2.64	3.07	2.94	2.83
Petrochemical Feedstocks	1.22	1.37	1.35	1.33	1.60	1.54	1.49	1.69	1.62	1.57
Residual Fuel	0.20	0.22	0.21	0.20	0.24	0.22	0.20	0.25	0.23	0.21
Motor Gasoline	0.16	0.16	0.16	0.16	0.19	0.18	0.18	0.20	0.19	0.19
Other Petroleum	4.03	4.42	4.38	4.34	5.04	4.93	4.82	5.30	5.17	5.03
Petroleum Subtotal	9.00	9.77	9.63	9.52	11.30	10.95	10.63	11.99	11.59	11.19
Natural Gas	7.43	8.94	8.62	8.47	10.57	9.84	9.20	11.42	10.58	9.74
Lease and Plant Fuel	1.35	1.40	1.40	1.40	1.65	1.65	1.65	1.69	1.69	1.69
Natural Gas Subtotal	8.78	10.34	10.02	9.88	12.22	11.49	10.85	13.11	12.27	11.43
Metallurgical Coal ¹	0.65	0.72	0.66	0.58	0.67	0.52	0.38	0.65	0.48	0.32
Steam Coal	1.47	1.43	1.41	1.39	1.50	1.45	1.39	1.53	1.47	1.40
Coal Subtotal	2.12	2.14	2.06	1.97	2.16	1.97	1.78	2.18	1.95	1.72
Renewable Energy	1.66	1.98	2.00	2.10	2.43	2.48	2.86	2.63	2.70	3.25
Electricity	3.39	3.89	3.82	3.64	4.69	4.47	4.11	5.16	4.85	4.41
Delivered Energy	24.94	28.12	27.53	27.11	32.80	31.36	30.22	35.08	33.35	32.00
Electricity Related Losses	7.53	8.37	8.22	7.83	9.57	9.12	8.39	10.34	9.72	8.84
Total	32.47	36.49	35.75	34.94	42.37	40.48	38.61	45.42	43.07	40.84
Delivered Energy Use per Dollar of Shipments (thousand Btu per 1996 dollar) ...										
	4.72	4.37	4.28	4.21	3.93	3.76	3.62	3.70	3.51	3.37
Onsite Industrial Combined Heat and Power										
Capacity (gigawatts)	19.91	24.20	24.28	26.85	29.87	30.68	36.20	32.56	34.45	40.80
Generation (billion kilowatthours)	119.26	148.84	149.23	166.76	187.92	193.26	228.93	206.59	219.49	259.07

¹Includes net coal coke imports.

Btu = British thermal unit.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports. Side cases were run without the fully integrated modeling system, so not all potential feedbacks were captured. The reference case ratio of electricity losses to electricity use was used to compute electricity losses for the technology cases.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs INDFRZN.D102303A, AEO2004.D101703E, and INDHIGH.D102303A.

Results from Side Cases

Table F3. Key Results for Transportation Sector Technology Cases

Consumption and Indicators	2002	2010			2020			2025		
		2004 Technology	Reference Case	High Technology	2004 Technology	Reference Case	High Technology	2004 Technology	Reference Case	High Technology
Energy Consumption										
(quadrillion Btu)										
Distillate Fuel	5.12	6.48	6.42	6.36	8.49	8.02	7.73	9.63	8.94	8.49
Jet Fuel	3.34	3.97	3.93	3.90	5.06	4.69	4.38	5.44	4.91	4.45
Motor Gasoline	16.62	19.91	19.88	19.76	23.76	23.11	22.52	26.14	24.98	24.14
Residual Fuel	0.71	0.80	0.79	0.79	0.82	0.82	0.81	0.84	0.83	0.81
Liquefied Petroleum Gas	0.02	0.06	0.06	0.06	0.08	0.08	0.07	0.09	0.08	0.08
Other Petroleum	0.24	0.25	0.25	0.25	0.30	0.30	0.30	0.32	0.32	0.32
Petroleum Subtotal	26.06	31.47	31.34	31.12	38.50	37.00	35.81	42.46	40.07	38.30
Pipeline Fuel Natural Gas	0.65	0.69	0.69	0.69	0.83	0.83	0.83	0.86	0.86	0.86
Compressed Natural Gas	0.01	0.06	0.06	0.06	0.10	0.10	0.09	0.11	0.11	0.10
Renewables (E85)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Liquid Hydrogen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.08	0.08	0.09	0.09	0.09	0.11	0.12	0.10	0.12	0.14
Delivered Energy	26.79	32.30	32.18	31.97	39.53	38.05	36.86	43.53	41.16	39.40
Electricity Related Losses	0.17	0.18	0.19	0.20	0.19	0.22	0.24	0.20	0.24	0.27
Total	26.96	32.49	32.37	32.17	39.72	38.27	37.10	43.73	41.41	39.68
Energy Efficiency Indicators										
New Light-Duty Vehicle (miles per gallon) ¹	23.8	25.0	25.3	25.9	24.9	26.5	27.9	24.8	26.9	28.5
New Car (miles per gallon) ¹	28.2	28.3	28.8	29.9	28.6	30.4	32.1	28.5	30.8	32.7
New Light Truck (miles per gallon) ¹	20.5	22.6	22.8	23.1	22.7	24.1	25.4	22.7	24.7	26.1
Light-Duty Fleet (miles per gallon) ²	19.7	19.6	19.6	19.7	19.9	20.5	21.2	19.8	20.9	21.8
New Commercial Light Truck (MPG) ³	13.9	15.0	15.1	15.4	14.9	16.0	17.0	14.9	16.4	17.4
Stock Commercial Light Truck (MPG) ³	13.8	14.4	14.5	14.5	14.9	15.5	16.0	14.9	15.9	16.7
Aircraft Efficiency (seat miles per gallon)	54.8	59.1	59.9	60.4	60.0	65.4	70.8	59.6	67.0	75.2
Freight Truck Efficiency (miles per gallon)	6.0	6.0	6.0	6.1	6.0	6.4	6.6	6.0	6.5	6.8
Rail Efficiency (ton miles per thousand Btu)	2.9	2.9	3.1	3.2	2.9	3.4	3.8	2.9	3.6	4.1
Domestic Shipping Efficiency (ton miles per thousand Btu)	2.3	2.3	2.3	2.4	2.3	2.4	2.5	2.3	2.4	2.6
Light-Duty Vehicles Less Than 8500 Pounds (vehicle miles traveled)										
	2504	3041	3041	3044	3748	3768	3792	4132	4173	4210

¹Environmental Protection Agency rated miles per gallon.

²Combined car and light truck "on-the-road" estimate.

³Commercial trucks 8,500 to 10,000 pounds.

Btu = British thermal unit.

MPG = Miles per gallon.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports. Side cases were run without the fully integrated modeling system, so not all potential feedbacks were captured. The reference case ratio of electricity losses to electricity use was used to compute electricity losses for the technology cases.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs TRNFRZN.D102403A, AEO2004.D101703E, and TRNHIGH.D102403A

Results from Side Cases

Table F4. Key Results for Integrated Technology Cases

Consumption and Emissions	2002	2010			2020			2025		
		2004 Technology	Reference Case	High Technology	2004 Technology	Reference Case	High Technology	2004 Technology	Reference Case	High Technology
Consumption by Sector (quadrillion Btu)										
Residential	20.9	23.1	23.1	22.8	25.4	25.1	24.1	26.6	26.1	24.7
Commercial	17.4	20.7	20.6	20.4	24.7	24.1	23.3	26.9	25.9	24.5
Industrial	32.5	36.5	35.7	34.9	42.6	40.5	38.4	45.8	43.1	40.3
Transportation	27.0	32.5	32.4	32.2	39.8	38.3	37.1	43.8	41.4	39.7
Total	97.7	112.9	111.8	110.3	132.5	127.9	122.9	143.0	136.5	129.2
Consumption by Fuel (quadrillion Btu)										
Petroleum Products	38.1	44.5	44.1	43.7	53.5	51.4	49.6	58.0	55.0	52.7
Natural Gas	23.4	27.4	26.8	26.3	32.6	31.2	30.1	33.3	32.2	31.6
Coal	22.2	25.4	25.2	24.5	29.4	28.3	25.5	34.4	31.7	26.5
Nuclear Power	8.1	8.3	8.3	8.3	8.5	8.5	8.5	8.5	8.5	8.5
Renewable Energy	5.8	7.1	7.2	7.4	8.3	8.5	9.2	8.7	9.0	9.9
Other	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Total	97.7	112.9	111.8	110.3	132.5	127.9	122.9	143.0	136.5	129.2
Energy Intensity (thousand Btu per 1996 dollar of GDP)										
	10.4	9.3	9.2	9.1	8.2	7.9	7.6	7.7	7.4	7.0
Carbon Dioxide Emissions by Sector (million metric tons)										
Residential	1189.0	1324.4	1317.2	1295.3	1478.1	1449.2	1354.5	1601.7	1543.0	1393.0
Commercial	1009.1	1212.8	1202.5	1179.2	1476.6	1422.9	1332.4	1669.5	1570.1	1412.3
Industrial	1670.6	1834.3	1789.6	1729.5	2137.1	2003.6	1836.0	2335.7	2149.5	1908.9
Transportation	1860.6	2258.5	2249.5	2234.3	2764.6	2659.9	2574.8	3046.7	2879.5	2758.3
Total	5729.3	6630.0	6558.8	6438.3	7856.4	7535.6	7097.6	8653.6	8142.0	7472.5
Carbon Dioxide Emissions by End-Use Fuel (million metric tons)										
Petroleum	2380.5	2750.7	2735.2	2714.0	3301.3	3176.2	3070.3	3603.9	3410.9	3264.3
Natural Gas	904.4	1069.5	1050.7	1041.8	1223.3	1176.8	1131.1	1293.5	1240.8	1171.6
Coal	195.4	209.7	202.4	194.2	211.4	193.6	176.4	213.6	191.4	171.1
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity	2249.0	2600.2	2570.6	2488.2	3120.4	2989.0	2719.8	3542.5	3299.0	2865.4
Total	5729.3	6630.0	6558.8	6438.3	7856.4	7535.6	7097.6	8653.6	8142.0	7472.5
Carbon Dioxide Emissions by the Electric Power Sector (million metric tons)										
Petroleum	72.2	58.3	51.0	45.2	81.9	65.2	55.7	66.6	61.6	60.4
Natural Gas	299.1	370.6	358.5	337.6	490.1	463.3	449.5	456.4	451.6	487.4
Coal	1877.8	2171.2	2161.2	2105.4	2548.4	2460.5	2214.6	3019.6	2785.8	2317.7
Total	2249.0	2600.2	2570.6	2488.2	3120.4	2989.0	2719.8	3542.5	3299.0	2865.4
Carbon Dioxide Emissions by Primary Fuel (million metric tons)										
Petroleum	2452.7	2809.0	2786.1	2759.3	3383.2	3241.4	3126.0	3670.5	3472.5	3324.7
Natural Gas	1203.4	1440.1	1409.2	1379.4	1713.4	1640.1	1580.6	1749.9	1692.4	1659.0
Coal	2073.2	2380.9	2363.6	2299.6	2759.8	2654.1	2391.1	3233.2	2977.1	2488.8
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5729.4	6630.0	6558.8	6438.3	7856.4	7535.6	7097.6	8653.6	8142.0	7472.5

Btu = British thermal unit.

GDP = Gross domestic product.

Note: Includes end-use, fossil electricity, and renewable technology assumptions. Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs LTRKITE.D102303A, AEO2004.D101703E, and HTRKITE.D103103A.

Results from Side Cases

Table F5. Key Results for Advanced Nuclear Cost Case
(Gigawatts, Unless Otherwise Noted)

Net Summer Capacity, Generation, Emissions, and Fuel Prices	2002	2010			2020			2025		
		Reference Case	Vendor Estimates	AP1000	Reference Case	Vendor Estimates	AP1000	Reference Case	Vendor Estimates	AP 1000
Capacity										
Coal Steam	310.9	310.3	310.3	310.2	353.5	354.0	354.1	412.3	402.9	393.5
Other Fossil Steam	133.6	106.1	106.0	106.0	101.1	100.2	100.3	96.5	96.5	96.0
Combined Cycle	110.5	160.0	159.9	160.0	217.3	215.6	213.7	235.2	232.6	232.0
Combustion Turbine/Diesel	128.8	136.5	136.6	136.6	169.2	166.6	167.4	180.4	182.0	181.3
Nuclear Power	98.7	100.6	100.6	100.6	102.6	106.9	106.9	102.6	115.4	128.4
Pumped Storage	20.2	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Renewable Sources	91.7	97.4	97.4	97.4	105.9	103.9	104.7	110.1	106.5	106.1
Distributed Generation (Natural Gas)	0.0	0.5	0.4	0.4	7.6	7.6	7.5	12.4	13.3	13.1
Combined Heat and Power ¹	26.6	33.1	33.1	33.1	42.1	42.0	41.9	47.4	47.2	47.2
Total	921.1	964.7	964.6	964.7	1119.7	1117.1	1116.9	1217.3	1216.8	1217.9
Cumulative Additions										
Coal Steam	0.0	6.8	6.8	6.8	51.9	52.3	52.4	111.8	102.3	93.0
Other Fossil Steam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combined Cycle	0.0	50.1	50.0	50.1	107.4	105.7	103.8	125.3	122.7	122.1
Combustion Turbine/Diesel	0.0	18.5	18.6	18.6	54.1	51.3	52.1	67.1	69.5	68.8
Nuclear Power	0.0	0.0	0.0	0.0	0.0	4.3	4.3	0.0	12.8	25.8
Pumped Storage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Renewable Sources	0.0	5.5	5.4	5.5	14.0	11.9	12.8	18.2	14.6	14.1
Distributed Generation	0.0	0.5	0.4	0.4	7.6	7.6	7.5	12.4	13.3	13.1
Combined Heat and Power ¹	0.0	6.5	6.5	6.5	15.5	15.4	15.4	20.9	20.7	20.7
Total	0.0	87.9	87.8	87.9	250.5	248.6	248.3	355.7	355.9	357.6
Cumulative Retirements	0.0	44.6	44.7	44.6	54.2	54.9	54.8	61.8	62.5	63.1
Generation by Fuel (billion kilowatthours)										
Coal	1907	2235	2234	2234	2593	2592	2592	3008	2935	2862
Petroleum	83	63	64	63	85	84	84	80	76	76
Natural Gas	598	816	816	816	1131	1112	1110	1117	1115	1104
Nuclear Power	780	794	794	794	816	848	848	816	913	1002
Pumped Storage	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9
Renewable Sources	309	405	405	405	446	439	442	464	450	448
Distributed Generation	0	0	0	0	3	3	3	5	6	6
Combined Heat and Power ¹	161	207	207	206	270	269	269	305	304	304
Total	3829	4510	4510	4510	5335	5337	5337	5787	5789	5792
Carbon Dioxide Emissions by the Electric Power Sector (million metric tons)²										
Petroleum	72.2	51.0	51.4	51.0	65.2	64.7	64.6	61.6	59.5	59.1
Natural Gas	299.1	358.5	358.3	358.5	463.3	456.8	456.5	451.6	451.9	447.7
Coal	1877.8	2161.2	2160.8	2160.4	2460.5	2458.5	2458.1	2785.8	2727.5	2669.1
Total	2249.0	2570.6	2570.5	2569.9	2989.0	2980.0	2979.3	3299.0	3238.9	3176.0
Prices to the Electric Power Sector² (2002 dollars per million Btu)										
Petroleum	4.32	4.21	4.20	4.21	4.67	4.66	4.67	4.88	4.83	4.87
Natural Gas	3.77	4.04	4.04	4.04	4.85	4.79	4.78	4.92	4.95	4.93
Coal	1.26	1.22	1.23	1.22	1.20	1.20	1.19	1.22	1.20	1.18

¹Includes combined heat and power plants and electricity-only plants in commercial and industrial sectors. Includes 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. Excludes off-grid photovoltaics and other generators not connected to the distribution or transmission systems.

²Includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs AEO2004.D101703E, ADVNUC3A.D102803A, and ADVNUC5A.D102803A.

Results from Side Cases

Table F6. Key Results for High Electricity Demand Case

Net Summer Capacity, Generation, Consumption, Emissions, and Prices	2002	2010		2020		2025		Annual Growth 2002-2025	
		Reference Case	High Demand	Reference Case	High Demand	Reference Case	High Demand	Reference Case	High Demand
Electricity Sales (billion kilowatthours) . . .	3492	4055	4296	4811	5480	5207	6149	1.8%	2.5%
Electricity Prices									
(2002 cents per kilowatthour)	7.2	6.6	6.8	6.9	7.1	6.9	7.1	-0.2%	-0.1%
Capacity (gigawatts)									
Coal Steam	310.9	310.3	314.9	353.5	405.7	412.3	498.1	1.2%	2.1%
Other Fossil Steam	133.6	106.1	116.0	101.1	112.0	96.5	110.5	-1.4%	-0.8%
Combined Cycle	110.5	160.0	181.0	217.3	274.1	235.2	293.5	3.3%	4.3%
Combustion Turbine/Diesel	128.8	136.5	149.0	169.2	192.3	180.4	219.5	1.5%	2.3%
Nuclear Power	98.7	100.6	100.6	102.6	102.6	102.6	102.6	0.2%	0.2%
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	N/A	N/A
Renewable Sources/Pumped Storage	111.9	117.7	121.4	126.3	134.7	130.5	144.1	0.7%	1.1%
Distributed Generation	0.0	0.5	1.0	7.6	14.3	12.4	23.0	N/A	N/A
Combined Heat and Power ¹	26.6	33.1	33.1	42.1	42.2	47.4	47.7	2.6%	2.6%
Total	921.1	964.7	1017.0	1119.7	1277.8	1217.3	1438.9	1.2%	2.0%
Cumulative Additions (gigawatts)									
Coal Steam	0.0	6.8	11.4	51.9	104.0	111.8	197.5	N/A	N/A
Other Fossil Steam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N/A	N/A
Combined Cycle	0.0	50.1	70.7	107.4	163.8	125.3	183.5	N/A	N/A
Combustion Turbine/Diesel	0.0	18.5	29.8	54.1	77.3	67.1	105.1	N/A	N/A
Nuclear Power	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N/A	N/A
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	N/A	N/A
Renewable Sources/Pumped Storage	0.0	5.5	9.1	14.0	22.4	18.2	31.8	N/A	N/A
Distributed Generation	0.0	0.5	1.0	7.6	14.3	12.4	23.0	N/A	N/A
Combined Heat and Power ¹	0.0	6.5	6.6	15.5	15.6	20.9	21.1	N/A	N/A
Total	0.0	87.9	128.5	250.5	397.4	355.7	562.1	N/A	N/A
Generation by Fuel (billion kilowatthours)									
Coal	1907	2235	2295	2593	2987	3008	3644	2.0%	2.9%
Petroleum	83	63	82	85	121	80	125	-0.2%	1.8%
Natural Gas	598	816	974	1131	1372	1117	1362	2.8%	3.6%
Nuclear Power	780	794	794	816	816	816	816	0.2%	0.2%
Renewable Sources/Pumped Storage	300	395	409	437	469	455	519	1.8%	2.4%
Distributed Generation	0	0	0	3	6	5	10	N/A	N/A
Combined Heat and Power ¹	161	207	207	270	271	305	307	2.8%	2.8%
Total	3829	4510	4762	5335	6042	5787	6784	1.8%	2.5%
Fossil Fuel Consumption by the Electric Power Sector (quadrillion Btu)²									
Petroleum	0.85	0.66	0.84	0.85	1.15	0.81	1.18	-0.2%	1.4%
Natural Gas	5.65	6.79	7.93	8.78	10.27	8.55	10.12	1.8%	2.6%
Coal	19.96	23.05	23.67	26.22	29.49	29.67	34.71	1.7%	2.4%
Carbon Dioxide Emissions by the Electric Power Sector (million metric tons)²									
Petroleum	72.2	51.0	63.9	65.2	86.6	61.6	88.7	-0.7%	0.9%
Natural Gas	299.1	358.5	418.5	463.3	542.1	451.6	534.6	1.8%	2.6%
Coal	1877.8	2161.2	2218.4	2460.5	2768.0	2785.8	3260.7	1.7%	2.4%
Total	2249.0	2570.6	2700.8	2989.0	3396.7	3299.0	3883.9	1.7%	2.4%
Prices to the Electric Power Sector ² (2002 dollars per million Btu)									
Petroleum	4.32	4.21	4.26	4.67	4.86	4.88	5.11	0.5%	0.7%
Natural Gas	3.77	4.04	4.26	4.85	5.08	4.92	5.30	1.2%	1.5%
Coal	1.26	1.22	1.24	1.20	1.26	1.22	1.29	-0.1%	0.1%

¹Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors. Includes 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. Excludes off-grid photovoltaics and other generators not connected to the distribution or transmission systems.

²Includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public.

Btu = British thermal unit.

N/A = not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports. Other includes non-coal fossil steam, pumped storage, methane, propane and blast furnace gas. Side case was run without the fully integrated modeling system, so not all potential feedbacks were captured.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs AEO2004.D101703E and HDEM04.D101903A

Results from Side Cases

Table F7. Key Results for Electric Power Sector Fossil Technology Cases
(Gigawatts, Unless Otherwise Noted)

Net Summer Capacity, Generation Consumption, and Emissions	2002	2010				2025			
		Low Fossil	Reference Case	High Fossil	DOE Fossil Goals	Low Fossil	Reference Case	High Fossil	DOE Fossil Goals
Capacity									
Pulverized Coal	310.4	309.8	309.8	307.4	307.5	425.5	405.5	328.5	304.6
Coal Gasification Combined-Cycle	0.5	0.5	0.5	0.5	2.0	0.9	6.8	26.2	90.3
Conventional Natural Gas Combined-Cycle	110.5	154.4	153.6	153.4	153.4	191.9	154.6	153.4	153.2
Advanced Natural Gas Combined-Cycle	0.0	2.6	6.4	13.4	12.6	9.0	80.6	189.6	162.7
Conventional Combustion Turbine	128.8	134.4	133.4	130.7	131.3	185.5	153.3	128.2	129.2
Advanced Combustion Turbine	0.0	3.3	3.1	2.0	2.4	10.7	27.1	18.2	15.1
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nuclear	98.7	100.6	100.6	100.6	100.6	102.6	102.6	102.6	102.6
Oil and Gas Steam	133.6	108.0	106.1	104.2	104.3	98.9	96.5	92.4	85.2
Renewable Sources/Pumped Storage	111.9	119.4	117.7	117.8	117.9	135.7	130.5	125.6	121.0
Distributed Generation	0.0	0.5	0.5	0.4	0.4	15.6	12.4	5.6	4.4
Combined Heat and Power ¹	26.6	33.1	33.1	33.1	33.1	47.5	47.4	47.3	46.8
Total	921.1	966.5	964.7	963.5	965.4	1223.7	1217.3	1217.7	1215.4
Cumulative Additions									
Pulverized Coal	0.0	6.8	6.8	4.5	4.6	125.4	105.5	28.5	4.6
Coal Gasification Combined-Cycle	0.0	0.0	0.0	0.0	1.5	0.4	6.3	25.7	89.8
Conventional Natural Gas Combined-Cycle	0.0	44.5	43.7	43.5	43.5	82.0	44.7	43.5	43.5
Advanced Natural Gas Combined-Cycle	0.0	2.6	6.4	13.4	12.6	9.0	80.6	189.6	162.7
Conventional Combustion Turbine	0.0	16.4	15.5	13.1	13.6	72.6	40.0	16.7	18.3
Advanced Combustion Turbine	0.0	3.3	3.1	2.0	2.4	10.7	27.1	18.2	15.1
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oil and Gas Steam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.0	7.1	5.5	5.5	5.6	23.4	18.2	13.4	8.8
Distributed Generation	0.0	0.5	0.5	0.4	0.4	15.6	12.4	5.6	4.4
Combined Heat and Power ¹	0.0	6.5	6.5	6.5	6.5	20.9	20.9	20.7	20.3
Total	0.0	87.7	87.9	88.9	90.6	360.0	355.7	361.8	367.5
Cumulative Retirements									
Total	0.0	42.6	44.6	46.8	46.6	59.8	61.8	67.6	75.6
Generation by Fuel (billion kilowatthours)									
Coal	1906.9	2234.8	2234.5	2217.4	2228.6	3100.2	3007.9	2614.6	2896.5
Petroleum	83.1	64.8	63.4	60.1	60.4	73.8	79.9	113.4	69.0
Natural Gas	598.1	808.7	816.4	836.8	825.2	1009.1	1117.5	1499.4	1287.6
Nuclear Power	780.1	794.3	794.3	794.3	794.3	816.5	816.5	816.5	816.5
Renewable Sources/Pumped Storage	300.1	400.7	395.1	395.6	395.5	476.7	455.0	437.0	414.1
Distributed Generation	0.0	0.2	0.2	0.2	0.2	6.8	5.4	2.4	1.9
Combined Heat and Power ¹	161.1	206.5	206.5	206.4	206.4	305.6	305.1	303.4	300.3
Total	3829.4	4510.2	4510.5	4510.8	4510.7	5788.7	5787.3	5786.7	5785.9
Fuel Consumption by the Electric Power Sector (quadrillion Btu)²									
Coal	19.96	23.06	23.05	22.90	22.98	30.51	29.67	26.02	26.99
Petroleum	0.85	0.68	0.66	0.63	0.64	0.78	0.81	0.99	0.66
Natural Gas	5.65	6.79	6.79	6.82	6.74	8.25	8.55	9.96	8.17
Nuclear Power	8.15	8.29	8.29	8.29	8.29	8.53	8.53	8.53	8.53
Renewable Sources	3.69	4.73	4.68	4.70	4.68	6.04	5.79	5.57	5.17
Total	38.29	43.55	43.48	43.35	43.34	54.10	53.35	51.05	49.52
Carbon Dioxide Emissions by the Electric Power Sector (million metric tons)²									
Petroleum	72.2	52.1	51.0	48.4	48.8	59.5	61.6	74.2	50.0
Natural Gas	299.1	358.3	358.5	360.1	356.1	435.4	451.6	525.8	431.5
Coal	1877.8	2161.7	2161.2	2146.9	2154.3	2865.0	2785.8	2440.7	2532.7
Total	2249.0	2572.1	2570.6	2555.5	2559.1	3359.9	3299.0	3040.8	3014.2

¹Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors. Includes 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. Excludes off-grid photovoltaics and other generators not connected to the distribution or transmission systems.

²Includes electricity-only and combined heat and power plants whose primary business to sell electricity, or electricity and heat, to the public.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports. Side cases were run without the fully integrated modeling system, so not all potential feedbacks were captured.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs LFOSS04.D101903A, AEO2004.D101703E, HFOSS10.D102103A, and HFOSS04.D101903A.

Results from Side Cases

Table F8. Key Results for High Renewable Energy Case

Capacity, Generation, and Emissions	2002	2010				2025			
		Low Renewables	Reference Case	High Renewables	DOE Renewable Goals	Low Renewables	Reference Case	High Renewables	DOE Renewable Goals
Renewable Capacity (gigawatts)									
Net Summer Capacity									
Electric Power Sector¹									
Conventional Hydropower	78.29	78.69	78.69	78.69	78.69	78.68	78.68	78.68	78.68
Geothermal ²	2.89	3.82	4.01	3.69	3.71	5.89	6.84	8.62	12.48
Municipal Solid Waste ³	3.49	3.92	3.92	3.89	3.89	3.95	3.95	3.95	3.95
Wood and Other Biomass ⁴	1.83	2.14	2.20	2.14	2.14	2.14	3.74	5.90	2.54
Solar Thermal	0.33	0.43	0.43	0.43	0.43	0.52	0.52	0.52	0.52
Solar Photovoltaic	0.02	0.15	0.15	0.15	0.15	0.41	0.41	0.41	0.41
Wind	4.83	7.89	8.01	7.83	9.79	10.79	15.99	35.35	80.83
Total	91.69	97.04	97.42	96.82	98.80	102.38	110.13	133.43	179.41
Combined Heat and Power⁵									
Municipal Solid Waste	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Wood and Other Biomass	3.91	5.31	5.36	5.81	5.81	7.81	8.03	10.31	10.31
Total	4.16	5.56	5.61	6.06	6.06	8.06	8.29	10.57	10.57
Other End-Use Generators⁶									
Conventional Hydropower	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Solar Photovoltaic	0.04	0.39	0.39	0.41	0.42	0.50	1.13	2.28	8.52
Total	1.06	1.41	1.41	1.44	1.45	1.52	2.15	3.31	9.55
Generation (billion kilowatthours)									
Electric Power Sector¹									
Coal	1875	2197	2201	2153	2154	2990	2975	2907	2702
Petroleum	77	62	62	73	74	76	77	78	71
Natural Gas	450	648	642	668	659	987	969	927	941
Total Fossil	2401	2908	2906	2895	2887	4053	4021	3912	3715
Conventional Hydropower	255.78	304.38	304.37	304.37	304.37	304.80	304.80	304.80	304.81
Geothermal	13.36	21.69	23.25	20.79	20.93	38.84	46.66	61.10	90.33
Municipal Solid Waste ³	20.02	28.11	28.11	27.90	27.88	28.50	28.50	28.49	28.50
Wood and Other Biomass ⁴	8.67	23.40	23.53	24.21	24.30	22.19	29.16	39.33	25.52
Dedicated Plants	6.32	13.01	13.26	12.99	13.04	12.99	22.90	35.62	15.61
Cofiring	2.35	10.39	10.26	11.21	11.25	9.20	6.25	3.71	9.92
Solar Thermal	0.54	0.84	0.84	0.84	0.93	1.11	1.11	1.11	1.41
Solar Photovoltaic	0.00	0.36	0.36	0.36	0.36	1.02	1.02	1.02	1.02
Wind	10.51	23.62	24.07	23.43	30.95	33.66	53.16	130.11	330.98
Total Renewable	308.87	402.39	404.52	401.90	409.72	430.12	464.40	565.95	782.56
Combined Heat and Power⁵									
Total Fossil	111	142	142	143	143	221	220	217	207
Municipal Solid Waste	1.84	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Wood and Other Biomass	28.16	36.34	36.63	39.28	39.27	50.93	52.26	65.57	65.57
Total Renewables	30.00	38.44	38.73	41.38	41.37	53.03	54.36	67.67	67.67
Other End-Use Generators⁶									
Conventional Hydropower ⁷	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Solar Photovoltaic	0.09	0.82	0.82	0.88	0.91	1.07	2.42	4.86	17.47
Total	4.20	4.93	4.93	4.99	5.02	5.18	6.53	8.97	21.58
Sources of Ethanol									
From Corn	0.17	0.29	0.29	0.28	0.28	0.31	0.31	0.27	0.27
From Cellulose	0.00	0.00	0.00	0.01	0.01	0.05	0.05	0.09	0.09
Total	0.17	0.29	0.29	0.29	0.29	0.35	0.35	0.36	0.36
Carbon Dioxide Emissions by the Electric Power Sector (million metric tons)¹									
Petroleum	72.2	50.8	51.0	59.5	59.7	60.7	61.6	61.9	57.9
Natural Gas	299.1	360.5	358.5	386.6	382.7	459.5	451.6	438.3	437.7
Coal	1877.8	2157.8	2161.2	2118.0	2118.6	2798.0	2785.8	2709.5	2564.5
Total	2249.0	2569.1	2570.6	2564.2	2560.9	3318.2	3299.0	3209.8	3060.1

¹Includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public.

²Includes hydrothermal resources only (hot water and steam).

³Includes landfill gas.

⁴Includes projections for energy crops after 2010.

⁵Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors.

⁶Includes 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. Excludes off-grid photovoltaics and other generators not connected to the distribution or transmission systems.

⁷Represents own-use industrial hydroelectric power.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs LORENEW04.D102703B, AEO2004.D101703E, HIREN1004.D103103A, and EERE04.D103103A.

Results from Side Cases

Table F9. Total Energy Supply and Disposition Summary, Oil and Gas Technological Progress Cases
(Quadrillion Btu per Year, Unless Otherwise Noted)

Supply, Disposition, and Prices	2002	2010			2020			2025		
		Slow Technology Progress	Reference Case	Rapid Technology Progress	Slow Technology Progress	Reference Case	Rapid Technology Progress	Slow Technology Progress	Reference Case	Rapid Technology Progress
Production										
Crude Oil and Lease Condensate . . .	11.91	12.46	12.56	12.67	10.02	10.49	11.07	8.99	9.77	10.28
Natural Gas Plant Liquids	2.56	3.06	3.10	3.19	3.29	3.47	3.79	3.23	3.47	3.88
Dry Natural Gas	19.56	20.76	21.05	21.75	23.10	24.43	27.10	22.79	24.64	28.21
Coal	22.70	25.28	25.25	25.13	28.47	27.92	27.21	31.97	31.10	29.51
Nuclear Power	8.15	8.29	8.29	8.29	8.53	8.53	8.53	8.53	8.53	8.53
Renewable Energy ¹	5.84	7.23	7.18	7.23	8.46	8.45	8.32	9.00	9.00	8.82
Other ²	1.13	0.87	0.88	0.89	0.81	0.81	0.81	0.84	0.84	0.84
Total	71.85	77.95	78.30	79.16	82.68	84.09	86.82	85.35	87.33	90.06
Imports										
Crude Oil ³	19.84	24.68	24.51	24.37	32.06	31.55	30.68	35.23	34.21	33.29
Petroleum Products ⁴	4.75	5.83	5.76	5.61	8.20	7.83	7.43	10.19	9.63	9.21
Natural Gas	4.10	6.47	6.54	6.22	7.69	7.56	6.94	8.01	8.29	7.90
Other Imports ⁵	0.52	0.95	0.95	0.95	1.11	1.12	1.11	1.17	1.18	1.18
Total	29.21	37.93	37.76	37.14	49.06	48.06	46.16	54.60	53.30	51.59
Exports										
Petroleum ⁶	2.03	2.14	2.15	2.14	2.12	2.13	2.16	2.17	2.15	2.17
Natural Gas	0.52	0.89	0.91	0.93	0.83	0.93	1.08	0.66	0.88	1.24
Coal	1.03	0.89	0.89	0.89	0.69	0.69	0.74	0.64	0.56	0.58
Total	3.58	3.93	3.95	3.96	3.64	3.75	3.97	3.47	3.59	3.98
Consumption										
Petroleum Products ⁷	38.11	44.24	44.15	44.08	51.56	51.35	50.99	55.51	54.99	54.63
Natural Gas	23.37	26.47	26.82	27.18	30.11	31.21	33.10	30.26	32.21	35.01
Coal	22.18	25.26	25.23	25.11	28.86	28.30	27.56	32.52	31.73	30.13
Nuclear Power	8.15	8.29	8.29	8.29	8.53	8.53	8.53	8.53	8.53	8.53
Renewable Energy ¹	5.84	7.23	7.18	7.23	8.46	8.46	8.32	9.00	9.00	8.82
Other ⁸	0.07	0.11	0.11	0.11	0.07	0.07	0.06	0.02	0.03	0.03
Total	97.72	111.60	111.77	112.00	127.59	127.92	128.54	135.84	136.48	137.14
Net Imports - Petroleum	22.56	28.38	28.13	27.83	38.14	37.25	35.95	43.26	41.69	40.34
Prices (2002 dollars per unit)										
World Oil Price (dollars per barrel) ⁹ . . .	23.68	24.17	24.17	24.17	26.02	26.02	26.02	27.00	27.00	27.00
Natural Gas Wellhead Price (dollars per thousand cubic feet) ¹⁰ . .	2.95	3.58	3.40	3.25	4.54	4.28	3.56	5.10	4.40	3.80
Coal Minemouth Price (dollars per ton)	17.90	16.95	16.88	16.81	16.55	16.32	16.12	16.80	16.57	16.39
Average Electricity Price (cents per kilowatt-hour)	7.2	6.7	6.6	6.6	7.0	6.9	6.6	7.1	6.9	6.6
Carbon Dioxide Emissions (million metric tons)										
	5729.4	6550.3	6558.8	6560.6	7546.5	7535.6	7536.4	8152.2	8142.0	8110.5

¹Includes grid-connected electricity from conventional hydroelectric; wood and wood waste; landfill gas; municipal solid waste; other biomass; wind; photovoltaic and solar thermal sources; non-electric energy from renewable sources, such as active and passive solar systems, and wood; and both the ethanol and gasoline components of E85, but not the ethanol components of blends less than 85 percent. Excludes electricity imports using renewable sources and nonmarketed renewable energy.

²Includes liquid hydrogen, methanol, supplemental natural gas, and some domestic inputs to refineries.

³Includes imports of crude oil for the Strategic Petroleum Reserve.

⁴Includes imports of finished petroleum products, unfinished oils, alcohols, ethers, and blending components.

⁵Includes coal, coal coke (net), and electricity (net).

⁶Includes crude oil and petroleum products.

⁷Includes natural gas plant liquids, crude oil consumed as a fuel, and nonpetroleum-based liquids for blending, such as ethanol.

⁸Includes net electricity imports, methanol, and liquid hydrogen.

⁹Average refiner acquisition cost for imported crude oil.

¹⁰Represents lower 48 onshore and offshore supplies.

Btu = British thermal unit.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports.

Sources: 2002 natural gas supply values: Energy Information Administration (EIA), *Natural Gas Monthly*, DOE/EIA-0130(2003/06) (Washington, DC, June 2003). 2002 petroleum supply values: EIA, *Petroleum Supply Annual 2002*, DOE/EIA-0340(2002)/1 (Washington, DC, June 2003). 2002 carbon dioxide emission values: EIA, *Emissions of Greenhouse Gases in the United States 2002*, DOE/EIA-0573(2002) (Washington, DC, October 2003). Other 2002 values: EIA, *Annual Energy Review 2001*, DOE/EIA-0384(2001) (Washington, DC, October 2002) and EIA, *Quarterly Coal Report*, October-December 2002, DOE/EIA-0121(2002/4Q) (Washington, DC, March 2003). Projections: EIA, AEO2004 National Energy Modeling System runs OGLTEC04.D102103A, AEO2004.D101703E, and OGHTEC04.D102003B.

Results from Side Cases

Table F10. Natural Gas Supply and Disposition, Oil and Gas Technological Progress Cases
(Trillion Cubic Feet per Year, Unless Otherwise Noted)

Supply, Disposition, and Prices	2002	2010			2020			2025		
		Slow Technology Progress	Reference Case	Rapid Technology Progress	Slow Technology Progress	Reference Case	Rapid Technology Progress	Slow Technology Progress	Reference Case	Rapid Technology Progress
Lower 48 Average Wellhead Price (2002 dollars per thousand cubic feet)	2.95	3.58	3.40	3.25	4.54	4.28	3.56	5.10	4.40	3.80
Dry Gas Production¹										
U.S. Total	19.05	20.21	20.50	21.18	22.49	23.79	26.39	22.19	23.99	27.46
Lower 48 Onshore	13.76	14.34	14.48	14.89	15.62	16.41	18.68	15.20	16.26	19.98
Associated-Dissolved	1.60	1.42	1.41	1.39	1.22	1.23	1.25	1.14	1.17	1.20
Non-Associated	12.16	12.92	13.08	13.50	14.41	15.18	17.43	14.06	15.09	18.78
Conventional	6.23	5.89	5.80	5.92	5.83	6.07	5.96	5.65	5.92	5.84
Unconventional	5.93	7.03	7.28	7.58	8.58	9.11	11.47	8.41	9.16	12.94
Lower 48 Offshore	4.86	5.28	5.41	5.69	4.58	5.09	5.42	4.29	5.03	5.16
Associated-Dissolved	1.05	1.56	1.61	1.66	1.25	1.34	1.49	1.12	1.43	1.54
Non-Associated	3.81	3.72	3.80	4.03	3.33	3.75	3.93	3.16	3.60	3.62
Alaska	0.43	0.60	0.60	0.60	2.29	2.29	2.29	2.71	2.71	2.33
Supplemental Natural Gas²	0.08	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Net Imports	3.49	5.44	5.50	5.17	6.70	6.47	5.72	7.18	7.24	6.50
Canada	3.59	3.47	3.68	3.89	2.03	2.51	2.84	1.56	2.56	3.24
Mexico	-0.26	-0.32	-0.34	-0.36	-0.08	-0.18	-0.32	0.15	-0.12	-0.48
Liquefied Natural Gas	0.17	2.29	2.16	1.63	4.74	4.14	3.20	5.46	4.80	3.75
Total Supply	22.62	25.75	26.09	26.44	29.29	30.36	32.20	29.46	31.33	34.06
Consumption by Sector										
Residential	4.92	5.50	5.53	5.57	5.86	5.92	6.03	6.00	6.09	6.27
Commercial	3.12	3.45	3.48	3.51	3.77	3.83	3.94	3.94	4.04	4.22
Industrial ³	7.23	8.32	8.39	8.44	9.46	9.57	9.88	10.02	10.29	10.64
Electric Generators ⁴	5.55	6.46	6.66	6.84	7.86	8.61	9.74	7.09	8.39	10.20
Transportation ⁵	0.01	0.06	0.06	0.06	0.10	0.10	0.10	0.11	0.11	0.11
Pipeline Fuel	0.63	0.66	0.67	0.69	0.77	0.81	0.88	0.77	0.84	0.92
Lease and Plant Fuel ⁶	1.32	1.35	1.36	1.39	1.54	1.61	1.71	1.56	1.65	1.78
Total	22.78	25.81	26.15	26.51	29.36	30.44	32.28	29.50	31.41	34.15
Gas to Liquids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discrepancy⁷	-0.16	-0.06	-0.06	-0.06	-0.08	-0.08	-0.08	-0.04	-0.09	-0.09
Lower 48 End of Year Reserves	180.03	193.63	201.20	212.12	185.12	200.97	239.47	171.76	193.51	238.82

¹Marketed production (wet) minus extraction losses.

²Synthetic 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.

³Includes consumption for combined heat and power, which produces electricity and other useful thermal energy.

⁴Includes consumption of energy by electricity-only and combined heat and power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public.

Includes small power producers and exempt wholesale generators.

⁵Compressed natural gas used as vehicle fuel.

⁶Represents natural gas used in the field gathering and processing plant machinery.

⁷Balancing 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, 2001 values include net storage injections.

Btu = British thermal unit.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports.

Sources: 2002 supply values: Energy Information Administration (EIA), *Natural Gas Monthly*, DOE/EIA-0130(2003/06) (Washington, DC, June 2003). 2002 consumption

based on: EIA, *Annual Energy Review 2001*, DOE/EIA-0384(2001) (Washington, DC, October 2002). Projections: EIA, AEO2004 National Energy Modeling System runs

OGLTEC04.D102103A, AEO2004.D101703E, and OGHTEC04.D102003B.

Results from Side Cases

Table F11. Crude Oil Supply and Disposition, Oil and Gas Technological Progress Cases
(Million Barrels per Day, Unless Otherwise Noted)

Supply, Disposition, and Prices	2002	2010			2020			2025		
		Slow Technology Progress	Reference Case	Rapid Technology Progress	Slow Technology Progress	Reference Case	Rapid Technology Progress	Slow Technology Progress	Reference Case	Rapid Technology Progress
World Oil Price										
(2002 dollars per barrel)	23.68	24.17	24.17	24.17	26.02	26.02	26.02	27.00	27.00	27.00
Production¹										
U.S. Total	5.62	5.88	5.93	5.98	4.73	4.95	5.23	4.25	4.61	4.85
Lower 48 Onshore	3.11	2.65	2.61	2.57	2.18	2.20	2.22	2.00	2.04	2.09
Lower 48 Offshore	1.53	2.32	2.40	2.49	1.86	2.03	2.28	1.75	2.06	2.25
Alaska	0.98	0.92	0.92	0.93	0.69	0.72	0.73	0.50	0.51	0.51
Net Crude Imports	9.13	11.30	11.21	11.15	14.74	14.50	14.08	16.22	15.74	15.31
Other Crude Supply	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Crude Supply	14.83	17.18	17.15	17.13	19.48	19.45	19.31	20.47	20.35	20.16
Natural Gas Plant Liquids	1.88	2.22	2.24	2.31	2.35	2.48	2.69	2.30	2.47	2.74
Other Inputs²	0.67	0.47	0.47	0.48	0.46	0.46	0.46	0.47	0.48	0.48
Refinery Processing Gain³	0.98	0.88	0.88	0.88	1.01	1.00	1.00	1.04	1.04	1.03
Net Product Imports⁴	1.41	1.99	1.95	1.88	3.19	2.99	2.76	4.22	3.94	3.70
Total Primary Supply⁵	19.77	22.73	22.69	22.66	26.47	26.38	26.22	28.50	28.27	28.11
Refined Petroleum Products Supplied										
Residential and Commercial	1.22	1.38	1.38	1.37	1.41	1.40	1.39	1.41	1.40	1.38
Industrial ⁶	4.80	5.14	5.14	5.13	5.86	5.86	5.79	6.23	6.21	6.15
Transportation	13.21	15.90	15.91	15.92	18.76	18.77	18.80	20.31	20.32	20.36
Electric Generators ⁷	0.38	0.34	0.29	0.26	0.48	0.38	0.27	0.59	0.36	0.24
Total	19.61	22.75	22.71	22.68	26.51	26.41	26.25	28.54	28.30	28.13
Discrepancy⁸	0.16	-0.02	-0.02	-0.02	-0.04	-0.04	-0.02	-0.04	-0.03	-0.03
Lower 48 End of Year Reserves										
(billion barrels) ¹	19.05	18.73	18.36	18.03	16.19	16.20	16.23	14.84	14.98	15.04

¹Includes lease condensate.

²Includes alcohols, ethers, petroleum product stock withdrawals, domestic sources of blending components, other hydrocarbons, natural gas converted to liquid fuel, and coal converted to liquid fuel.

³Represents volumetric gain in refinery distillation and cracking processes.

⁴Includes net imports of finished petroleum products, unfinished oils, other hydrocarbons, alcohols, ethers, and blending components.

⁵Total crude supply plus natural gas plant liquids, other inputs, refinery processing gain, and net product imports.

⁶Includes consumption for combined heat and power, which produces electricity and other useful thermal energy.

⁷Includes consumption of energy by electricity-only and combined heat and power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. Includes small power producers and exempt wholesale generators.

⁸Balancing item. Includes unaccounted for supply, losses and gains.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports.

Sources: 2002 product supplied data based on: Energy Information Administration (EIA), *Annual Energy Review 2001*, DOE/EIA-0384(2001) (Washington, DC, October 2002). Other 2002 data: EIA, *Petroleum Supply Annual 2002*, DOE/EIA-0340(2002)/1 (Washington, DC, June 2003). Projections: EIA, AEO2004 National Energy Modeling System runs OGLTEC04.D102103A, AEO2004.D101703E, and OGHTEC04.D102003B.

Results from Side Cases

Table F12. Key Results for Coal Mining Cost Cases

Prices, Productivity, Wages, and Emissions	2002	2010			2020			2025		
		Low Cost	Reference Case	High Cost	Low Cost	Reference Case	High Cost	Low Cost	Reference Case	High Cost
Minemouth Price										
(2002 dollars per short ton)	17.90	15.68	16.88	18.28	13.87	16.32	19.67	13.27	16.57	21.45
Delivered Price to Electric Generators										
(2002 dollars per million Btu)	1.26	1.16	1.22	1.29	1.07	1.20	1.36	1.04	1.22	1.44
Labor Productivity										
(short tons per miner per hour)	6.80	8.54	7.59	6.75	11.30	8.57	6.27	13.10	9.19	5.94
Labor Productivity										
(average annual growth from 2002)	0.00	2.89	1.38	-0.09	2.86	1.29	-0.45	2.89	1.32	-0.59
Average Coal Miner Wage										
(2002 dollars per hour)	19.64	18.87	19.64	20.44	17.95	19.64	21.48	17.50	19.64	22.03
Average Coal Miner Wage										
(average annual growth from 2002)	0.00	-0.50	0.00	0.50	-0.50	0.00	0.50	-0.50	0.00	0.50
Carbon Dioxide Emissions by the Electric Power Sector (million metric tons)¹										
Petroleum	72.2	50.5	51.0	50.9	55.7	65.2	76.7	60.0	61.6	79.2
Natural Gas	299.1	359.3	358.5	365.2	425.3	463.3	503.3	419.9	451.6	509.8
Coal	1877.8	2165.1	2161.2	2134.6	2592.7	2460.5	2304.2	2901.8	2785.8	2520.1
Total	2249.0	2574.8	2570.6	2550.7	3073.7	2989.0	2884.2	3381.8	3299.0	3109.1
Electric Power Sector Capacity ¹										
(gigawatts)										
Coal	310.9	310.5	310.3	306.8	378.2	353.5	326.3	434.0	412.3	364.7
Other	583.6	618.6	621.4	621.9	699.8	724.2	750.4	741.5	757.6	813.8
Total	894.5	929.1	931.7	928.7	1078.0	1077.7	1076.7	1175.6	1169.9	1178.5

¹Includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public.

Btu = British thermal unit.

N/A = Not applicable.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs LMCST04.D102303A, AEO2004.D101703E, and HMCST04.D102303A.