

Chapter 2

Energy

Summary Statistics

Table		
2.4	Transportation share of U.S. energy consumption, 1997	27.4%
2.5	Petroleum share of Transportation energy consumption, 1997	96.9%
2.7	Transportation energy use by mode, 1996	(trillion Btu)
	<i>Automobiles</i>	8,622
	<i>Trucks</i>	9,923
	<i>Buses</i>	177
	<i>Air</i>	2,196
	<i>Water</i>	1,460
	<i>Pipeline</i>	984
	<i>Rail</i>	578
2.10	Alternative vehicle fuel consumption, 1997 (thousand gasoline equivalent gallons)	
	<i>Liquified petroleum gas</i>	244,612
	<i>Compressed natural gas</i>	63,258
	<i>Liquified natural gas</i>	4,567
	<i>M85/M100</i>	3,972
	<i>E85/E100</i>	4,044
	<i>Electricity</i>	936
2.10	Oxygenate consumption, 1997 (thousand gasoline equivalent gallons)	
	<i>MTBE</i>	2,923,700
	<i>Ethanol in gasohol</i>	787,800



Table 2.1
World Production of Primary Energy by Selected Country Groups, 1987-96

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996 ^a
Petroleum (thousand barrels per day)^b										
World total	62,427	64,705	65,892	66,754	66,632	66,960	67,361	68,250	69,860	71,764
OECD ^c	20,793	20,727	20,019	20,142	20,710	21,060	21,217	21,894	22,354	23,102
Non OECD	41,633	43,978	45,873	46,611	45,922	45,901	46,145	46,356	47,506	48,663
Natural gas (trillion cubic feet)										
World total	66.54	69.81	72.25	73.61	74.81	74.87	76.30	76.80	77.92	81.96
OECD ^c	29.14	29.78	30.47	31.03	31.77	32.49	33.60	34.82	35.42	37.49
Non OECD	37.41	40.03	41.78	42.58	43.04	42.38	42.69	41.98	42.50	44.47
Coal (million short tons)										
World total	5,130	5,235	5,324	5,356	5,033	5,052	4,930	5,033	5,144	5,185
OECD ^c	2,417	2,425	2,457	2,418	2,257	2,200	2,167	2,225	2,218	2,254
Non OECD	2,713	2,811	2,867	2,938	2,776	2,852	2,762	2,808	2,926	2,931
Hydroelectric power (billion kilowatthours)										
World total	2,027.9	2,106.4	2,089.6	2,173.6	2,213.2	2,215.2	2,348.4	2,348.9	2,486.7	2,530.2
OECD ^c	1,144.4	1,168.0	1,137.4	1,177.8	1,190.4	1,178.2	1,249.4	1,198.9	1,284.3	1,317.2
Non OECD	883.5	938.4	952.2	995.8	1,022.8	1,037.0	1,099.0	1,150.1	1,202.4	1,212.9
Nuclear electric power (billion kilowatthours)										
World total	1,654.0	1,794.8	1,843.4	1,905.1	1,992.0	2,011.8	2,073.7	2,117.8	2,203.0	2,280.0
OECD ^c	1,390.6	1,499.8	1,540.2	1,607.6	1,694.1	1,718.5	1,791.1	1,851.6	1,925.1	1,972.8
Non OECD	263.4	295.1	303.3	297.6	297.9	293.3	282.7	266.2	277.8	307.2
Geothermal, solar, and wind electric power (billion kilowatthours)^d										
World total	34.0	34.8	79.4	234.5	235.7	249.9	257.0	265.3	268.9	282.4
OECD ^c	23.0	23.3	67.7	221.8	222.3	235.8	241.9	248.8	251.7	264.2
Non OECD	11.0	11.5	11.6	12.6	13.4	14.2	15.1	16.5	17.2	18.2

Source:

U.S. Department of Energy, Energy Information Administration, *International Energy Annual 1996*, Washington, DC, February 1998, pp. 23-24. (Additional resources: <http://www.eia.doe.gov>)

^a Preliminary.

^b Data include the production of crude oil, natural gas plant liquids, refinery gain, and other liquid fuels.

^c Organization for Economic Cooperation and Development (OECD). See Glossary for membership.

^d Includes biofuels electric power generation for United States and Brazil.



Table 2.2
World Consumption of Primary Energy by Selected Country Groups, 1987-96

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996 ^a
Petroleum (thousand barrels per day)										
World total	62,999	64,819	65,917	65,985	66,577	66,742	67,043	68,313	69,926	71,524
OECD ^b	38,957	40,238	40,881	40,917	41,400	42,414	43,054	44,197	45,072	46,147
Non OECD	24,042	24,581	25,036	25,068	25,177	24,327	23,989	24,116	24,855	25,376
Natural gas (trillion cubic feet)										
World total	66.28	69.57	72.52	72.96	74.52	74.44	76.69	76.37	78.29	82.17
OECD ^b	33.19	34.24	35.87	35.88	37.23	37.91	39.65	40.55	42.67	45.00
Non OECD	33.09	35.33	36.65	37.08	37.30	36.53	37.04	35.82	35.62	37.17
Coal (million short tons)										
World total	5,134	5,283	5,281	5,263	5,006	5,017	4,995	5,063	5,120	5,167
OECD ^b	2,432	2,468	2,490	2,415	2,296	2,229	2,280	2,279	2,268	2,320
Non OECD	2,701	2,815	2,791	2,848	2,710	2,788	2,716	2,784	2,852	2,848
Hydroelectric power (billion kilowatthours)										
World total	2,074.2	2,138.1	2,096.3	2,182.6	2,232.6	2,238.9	2,373.1	2,376.7	2,512.7	2,561.5
OECD ^b	1,190.8	1,199.8	1,144.2	1,186.8	1,209.8	1,201.9	1,274.1	1,226.7	1,310.3	1,348.6
Non OECD	883.5	938.4	952.2	995.8	1,022.8	1,037.0	1,099.0	1,150.1	1,202.4	1,212.9
Nuclear electric power (billion kilowatthours)										
World total	1,654.0	1,794.8	1,843.4	1,905.1	1,992.0	2,011.8	2,073.7	2,117.8	2,203.0	2,280.0
OECD ^b	1,390.6	1,499.8	1,540.2	1,607.6	1,694.1	1,718.5	1,791.1	1,851.6	1,925.1	1,972.8
Non OECD	263.4	295.1	303.3	297.6	297.9	293.3	282.7	266.2	277.8	307.2
Geothermal, solar, and wind electric power (billion kilowatthours)^c										
World total	34.0	34.8	79.4	234.5	235.7	249.9	257.0	265.3	268.9	282.4
OECD ^b	23.0	23.3	67.7	221.8	222.3	235.8	241.9	248.8	251.7	264.2
Non OECD	11.0	11.5	11.6	12.6	13.4	14.2	15.1	16.5	17.2	18.2

Source:

U.S. Department of Energy, Energy Information Administration, *International Energy Annual 1996*, Washington, DC, February 1998, pp. 3-4.
(Additional resources: <http://www.eia.doe.gov>)

^a Preliminary.

^b Organization for Economic Cooperation and Development (OECD). See Glossary for membership.

^c Includes the consumption of biofuels electric power for United States and Brazil.



Table 2.3
World Energy Production and Consumption, 1996^a
(trillion Btu)

	Production	Consumption
Petroleum		
World total	151.93	151.41
OECD ^b	48.91	97.69
Non OECD	103.02	53.72
Natural gas		
World total	84.17	84.39
OECD ^b	38.50	46.22
Non OECD	45.67	38.17
Coal		
World total	0.000110	0.000110
OECD ^b	0.000048	0.000049
Non OECD	0.000062	0.000061
Hydroelectric power^c		
World total	8,633	8,740
OECD ^b	4,494	4,601
Non OECD	4,138	4,138
Nuclear electric power		
World total	7,779	7,779
OECD ^b	6,731	6,731
Non OECD	1,048	1,048
Geothermal, solar, and wind electric power^d		
World total	963	963
OECD ^b	901	901
Non OECD	62	62

Source:

U.S. Department of Energy, Energy Information Administration, *International Energy Annual 1996*, Washington, DC, February 1998, pp. 3-4, 23-24. (Additional resources: <http://www.eia.doe.gov>)

^a Preliminary.

^b Organization for Economic Cooperation and Development (OECD). See Glossary for membership.

^c Electricity generation and distribution were not taken into account when converting kWhr to Btu.

^d Includes the consumption of biofuels electric power for United States and Brazil.



Total energy use in the U.S. rose to 90 quads in 1996. The transportation sector continues to account for more than 27% of total energy use.

Table 2.4
U. S. Consumption of Total Energy by End-Use Sector, 1970-97^a
(quadrillion Btu)

Year	Transportation	Percentage transportation of total	Residential and commercial	Industrial	Total
1970	16.07	24.2%	21.71	28.65	66.43
1971	16.70	24.6%	22.59	28.59	67.88
1972	17.70	24.8%	23.69	29.88	71.27
1973	18.61	25.1%	24.14	31.53	74.28
1974	18.12	25.0%	23.73	30.69	72.54
1975	18.24	25.9%	23.90	28.40	70.54
1976	19.10	25.7%	25.02	30.24	74.36
1977	19.82	26.0%	25.39	31.08	76.29
1978	20.61	26.4%	26.08	31.39	78.09
1979	20.47	25.9%	25.81	32.62	78.90
1980	19.70	25.9%	25.66	30.61	75.96
1981	19.51	26.4%	25.24	29.24	73.99
1982	19.07	26.9%	25.63	26.15	70.85
1983	19.13	27.1%	25.63	25.76	70.52
1984	19.80	26.7%	26.47	27.87	74.14
1985	20.07	27.1%	26.70	27.21	73.98
1986	20.81	28.0%	26.85	26.63	74.30
1987	21.45	27.9%	27.62	27.83	76.89
1988	22.31	27.8%	28.93	28.99	80.22
1989	22.56	27.7%	29.40	29.35	81.33
1990	22.54	27.7%	28.79	29.94	81.27
1991	22.12	27.3%	29.42	29.57	81.12
1992	22.46	27.3%	29.11	30.58	82.15
1993	22.88	27.3%	30.24	30.75	83.87
1994	23.57	27.5%	30.44	31.59	85.60
1995	24.07	27.6%	31.27	31.86	87.21
1996	24.63	27.4%	32.63	32.74	90.04
1997	24.78	27.4%	32.83	32.92	90.59
		<i>Average annual percentage change</i>			
1970-97	1.6%		1.5%	0.5%	1.2%
1987-97	1.5%		1.7%	1.7%	1.7%

Source:

U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, March 1998, Washington, DC, Table 2.2, p. 25. (Additional resources: <http://www.eia.doe.gov>)

^aElectrical energy losses have been distributed among the sectors.





Due to the lack of consistent historical data, renewable energy sources are not included for sectors other than the electric utilities.

Table 2.5
Distribution of Energy Consumption by Source, 1973, 1980, and 1997
(percentage)

Energy source	Transportation			Residential & Commercial			Industrial			Electric utilities		
	1973	1980	1997	1973	1980	1997	1973	1980	1997	1973	1980	1997
Petroleum	95.8	96.5	96.9	18.2	11.8	6.7	28.9	31.1	28.1	17.7	10.7	2.5
Natural gas ^a	4.0	3.3	2.9	31.6	29.4	25.9	32.9	27.4	31.3	18.9	15.5	9.2
Coal	0.0	0.0	0.0	1.1	0.6	0.4	12.8	10.3	7.2	43.6	49.5	55.9
Hydroelectric	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	15.0	12.6	11.7
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	11.2	20.3
Electricity ^b	0.2	0.2	0.2	49.2	58.2	67.0	25.2	31.1	33.3	0.0	0.0	0.0
Other ^c	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source:

U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, March 1998, Washington, DC, pp. 27, 29, 31, 33.
(Additional resources: <http://www.eia.doe.gov>)

^a Includes supplemental gaseous fuels. Transportation sector includes pipeline fuel and natural gas vehicle use.

^b Includes electrical system energy losses.

^c Energy generated from geothermal, wood, waste, wind, photovoltaic, and solar thermal energy sources.

As data about alternative fuel use come available, an attempt is made to incorporate it into this table. Sometimes assumptions must be made in order to use the data. Please see Appendix A for detailed methodology of all energy data.

Table 2.6
Domestic Consumption of Transportation Energy by Mode and Fuel Type, 1996^a
(trillion Btu)

	Gasoline	Diesel fuel	Liquified petroleum gas	Jet fuel	Residual fuel oil	Natural gas	Electricity	Methanol
HIGHWAY	14,829.2	3,885.9	26.7			2.8	0.8	0.4
Automobiles	8,497.3 ^b	124.2				0.2		0.0
Motorcycles	24.8							
Buses	31.0	141.9	0.5			1.9	0.8	0.4
Transit	5.3	76.1	0.5			1.9	0.8	0.4
Intercity ^c		23.1						
School ^c	25.7	42.7						0.0
Trucks	6,276.1	3,619.8	26.2			0.7		0.0
Light trucks ^d	5,679.5	215.7	12.8			0.7		0.0
Other trucks	596.6	3,404.1	13.4			0.0		0.0
OFF-HIGHWAY	150.3	570.1^e						
Construction	35.5	178.5 ^e						
Agriculture	114.8	391.6 ^e						
NONHIGHWAY	323.6	791.6		2,161.5	962.7	733.5	311.1	
Air	34.4			2,161.5				
General aviation	34.4			76.6				
Domestic air carriers				1,773.1				
International air carriers ^f				311.8				
Water	289.2	302.0			869.0			
Freight		302.0			869.0			
Recreational	289.2							
Pipeline						733.5	250.0	
Rail		517.3					61.1	
Freight (Class I)		499.4						
Passenger		17.9					61.1	
Transit							43.0	
Commuter		9.0					14.9	
Intercity ^e		8.9					3.2	
TOTAL	15,303.1	5,275.3	26.7	2,161.5	869.0	736.3	311.9	0.4

Source:

See Appendix A for Table 2.6

^a Civilian consumption only. Totals may not include all possible uses of fuels for transportation (e.g., snowmobiles).

^b Includes gasohol.

^c Estimated using vehicle travel information.

^d Two-axle, four-tire trucks.

^e 1985 data.

^f Represents an estimate of energy purchased in the U.S. for international air carrier consumption.



The 1995 data have been revised to include the latest data available.

Table 2.7
Transportation Energy Use by Mode, 1995-96^a

	Trillion Btu		Thousand barrels per day crude oil equivalent ^b		Percentage of total	
	1995	1996	1995	1996	1995	1996
HIGHWAY	18,388.9	18,745.8	9,254.3	9,430.5	75.7%	75.9%
Automobiles	8,518.6	8,621.7	4,287.0	4,337.3	35.1%	34.9%
Motorcycles	24.5	24.8	12.3	12.5	0.1%	0.1%
Buses	178.5	176.5	89.8	88.8	0.7%	0.7%
Transit	87.5	85.0	44.0	42.8	0.4%	0.3%
Intercity	22.6	23.1 ^c	11.4	11.6 ^c	0.1%	0.1%
School	68.4	68.4 ^c	34.4	34.4 ^c	0.3%	0.3%
Trucks	9,667.3	9,922.8	4,865.1	4,991.9	39.8%	40.2%
Light trucks ^d	5,717.3	5,908.7	2,877.3	2,972.5	23.5%	23.9%
Other trucks	3,950.0	4,014.1	1,987.9	2,019.4	16.3%	16.3%
OFF-HIGHWAY	720.9	720.4	362.8	362.4	3.0%	2.9%
Construction	213.5	214.0	107.4	107.7	0.9%	0.9%
Agriculture	507.4	506.4	255.5	254.8	2.1%	2.1%
NONHIGHWAY	5,174.9	5,284.0	2,604.3	2,658.2	21.3%	21.1%
Air	2,117.2	2,195.9	1,065.5	1,104.7	8.7%	8.9%
General aviation	106.6	111.0	53.6	55.8	0.4%	0.4%
Domestic air carriers	1,710.7	1,773.1	860.9	892.0	7.0%	7.2%
International air carriers	299.9	311.8	150.9	156.9	1.2%	1.3%
Water	1,521.8	1,460.2	765.9	734.6	6.3%	5.9%
Freight	1,237.0	1,171.0	622.5	589.1	5.1%	4.7%
Recreational	284.8	289.2	143.3	145.5	1.2%	1.2%
Pipeline	970.5	983.5	488.4	494.8	4.0%	4.0%
Rail	565.4	578.4	284.5	291.0	2.3%	2.3%
Freight	485.9	499.4	244.5	251.2	2.0%	2.0%
Passenger	79.5	79.0	40.0	39.7	0.3%	0.3%
Transit	43.6	43.0	21.9	21.6	0.2%	0.2%
Commuter	23.4	23.9	11.8	12.0	0.1%	0.1%
Intercity	12.5 ^c	12.1 ^c	6.3	6.1 ^c	0.1%	0.0%
TOTAL	24,284.7	24,684.2	12,221.4	12,417.9	100.0%	100.0%

Source: See Appendix A for Table 2.6 (detailed breakdown).

^aCivilian consumption only. Totals may not include all possible uses of fuels for transportation (e.g., snowmobiles).

^bThousand barrels per day crude oil equivalents based average on the EIA weighted average of heat content of petroleum products used in transportation.

^cEstimated using vehicle travel information.

^dTwo-axle, four-tire trucks.



The Federal Highway Administration produced revised estimates of auto, light truck, and other truck historical fuel use in order to produce a consistent trend. Light trucks include pickups, vans, and sport utility vehicles.

Table 2.8
Transportation Energy Consumption by Mode, 1970-96
 (trillion Btu)

Year	Automobiles	Motorcycles	Buses ^a	Light trucks	Other trucks	Total highway	Air	Water	Pipeline	Rail	Total nonhighway	Total transportation ^b
1970	8,527	7	109	1,540	1,503	11,686	1,307	753	985	558	3,603	15,289
1971	8,970	9	108	1,686	1,569	12,342	1,304	698	1,007	560	3,569	15,911
1972	9,547	11	106	1,895	1,722	13,281	1,314	703	1,039	583	3,639	16,920
1973	9,836	13	109	2,105	1,902	13,965	1,377	827	996	619	3,819	17,784
1974	9,332	14	113	2,083	1,904	13,446	1,254	804	932	624	3,614	17,060
1975	9,321	14	119	2,386	1,939	13,779	1,274	851	835	563	3,523	17,302
1976	9,844	15	129	2,605	2,046	14,639	1,333	1,001	803	585	3,722	18,361
1977	9,940	16	132	2,799	2,268	15,155	1,411	1,103	781	595	3,890	19,045
1978	10,140	18	135	3,022	2,539	15,854	1,467	1,311	781	589	4,148	20,002
1979	9,629	22	137	3,057	2,644	15,489	1,568	1,539	856	613	4,576	20,065
1980	8,798	26	139	2,976	2,651	14,590	1,528	1,677	889	596	4,690	19,280
1981	8,695	27	143	2,964	2,706	14,535	1,455	1,562	899	565	4,481	19,016
1982	8,695	25	146	2,839	2,707	14,412	1,468	1,290	853	488	4,099	18,511
1983	8,814	22	145	2,995	2,757	14,733	1,505	1,187	738	482	3,912	18,645
1984	8,857	22	154	3,202	2,846	15,081	1,633	1,251	780	523	4,187	19,268
1985	8,954	23	161	3,422	2,842	15,402	1,678	1,311	758	487	4,234	19,636
1986	9,162	23	154	3,636	2,903	15,878	1,823	1,295	738	423	4,279	20,157
1987	9,179	24	157	3,827	2,990	16,177	1,894	1,326	775	485	4,480	20,657
1988	9,180	25	159	4,096	3,117	16,577	1,978	1,338	878	498	4,692	21,269
1989	9,251	26	163	4,173	3,196	16,809	1,981	1,376	895	501	4,753	21,562
1990	8,707	24	163	4,467	3,329	16,690	2,059	1,487	928	492	4,966	21,656
1991	8,048	23	174	4,793	3,396	16,434	1,926	1,567	864	463	4,820	21,254
1992	8,188	24	182	5,134	3,460	16,988	1,971	1,641	849	476	4,937	21,925
1993	8,389	25	192	5,375	3,567	17,548	1,996	1,473	889	513	4,871	22,419
1994	8,494	26	202	5,530	3,772	18,024	2,056	1,414	955	546	4,971	22,995
1995	8,519	25	179	5,717	3,950	18,390	2,117	1,522	971	565	5,175	23,565
1996	8,622	25	177	5,909	4,014	18,747	2,196	1,460	984	578	5,218	23,965
<i>Average annual percentage change</i>												
1970-96	0.0%	5.0%	1.9%	5.3%	3.9%	1.8%	2.0%	2.6%	0.0%	0.1%	1.4%	1.7%
1986-96	-0.6%	0.8%	1.4%	5.0%	3.3%	1.7%	1.9%	1.2%	2.5%	3.2%	2.0%	1.7%

Source:

See Appendix A for Table 2.8.

^a Beginning in 1992 data became available on alternative fuel use by transit buses.

^b Total transportation figures do not include military and off-highway energy use and may not include all possible uses of fuel for transportation (e.g. snowmobiles).





The Federal Highway Administration cautions that data from 1993-on may not be directly comparable to earlier years. Some states have improved reporting procedures in recent years, and the estimation procedures were revised in 1994. Prior to the Energy Policy Act of 1992, gasohol was defined as a blend of gasoline and at least 10%, by volume, alcohol. Effective January 1, 1993, three types of gasohol were defined: 10% gasohol—containing at least 10% alcohol; 7.7% gasohol—containing 7.7% alcohol but less than 10%; and 5.7% gasohol—containing at least 5.7% alcohol but less than 7.7%.

Table 2.9
Highway Usage of Gasoline and Special Fuels, 1973-96
 (million gallons)

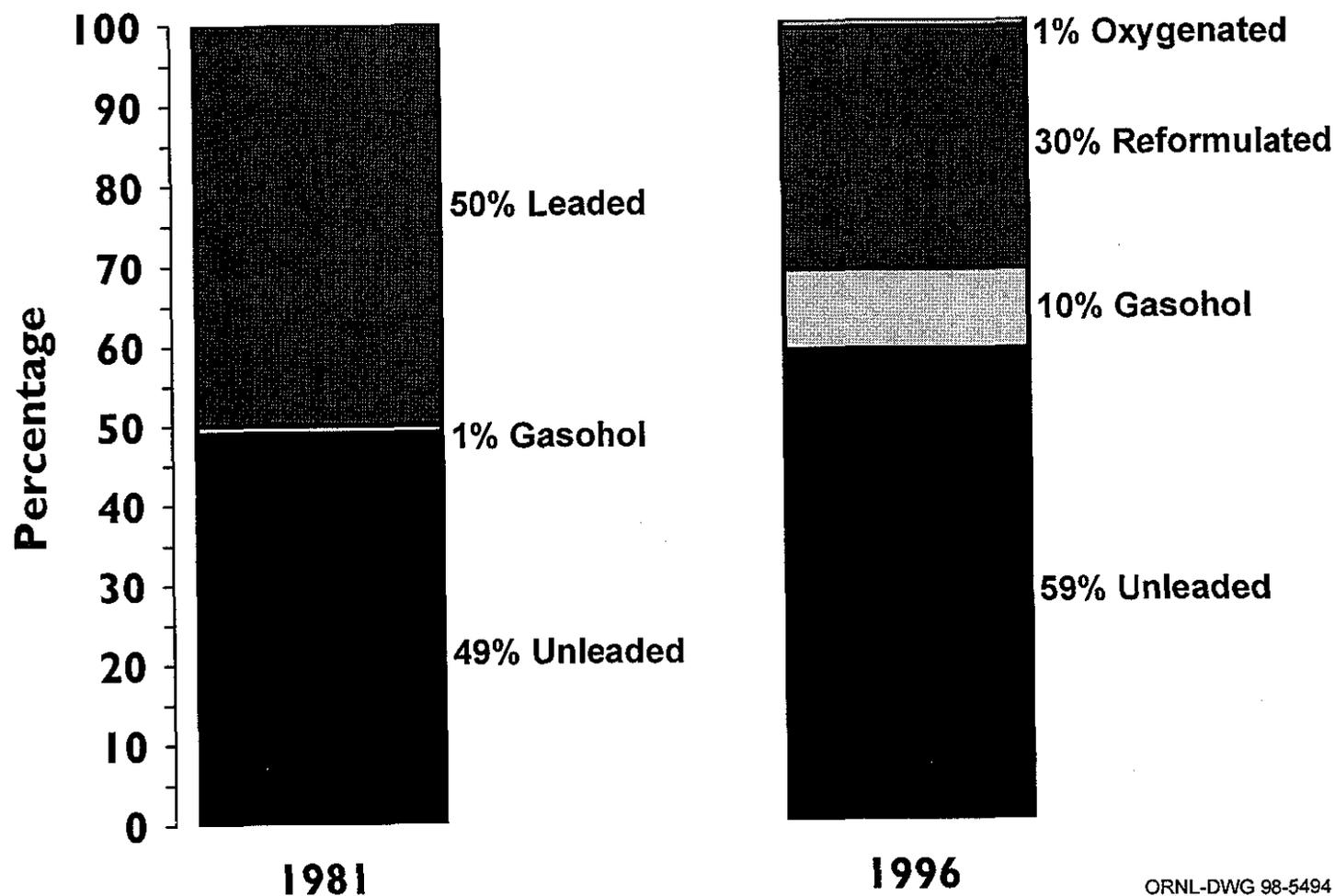
Year	Gasoline	Gasohol	Ethanol used in gasohol ^a	Total gasoline and gasohol	Special fuels ^b	Percent special fuels	Total highway fuel use
1973	c	c	c	100,636	9,837	8.9%	110,473
1974	c	c	c	96,505	9,796	9.2%	106,301
1975	c	c	c	99,354	9,631	8.8%	108,985
1976	c	c	c	104,978	10,721	9.3%	115,699
1977	c	c	c	107,978	11,646	9.7%	119,624
1978	c	c	c	112,239	12,828	10.3%	125,067
1979	c	c	c	108,126	13,989	11.5%	122,115
1980	100,686	497	49.7	101,183	13,777	12.0%	114,960
1981	98,884	713	71.3	99,597	14,856	13.0%	114,453
1982	96,220	2,259	225.9	98,479	14,905	13.1%	113,384
1983	95,852	4,254	425.5	100,106	15,975	13.8%	116,081
1984	95,996	5,420	542.0	101,416	17,320	14.6%	118,736
1985	95,567	8,004	781.7	103,571	17,751	14.6%	121,322
1986	98,618	8,138	780.7	106,756	18,427	14.7%	125,183
1987	101,790	6,912	800.4	108,702	19,046	14.9%	127,748
1988	101,678	8,138	813.8	109,816	20,070	15.5%	129,886
1989	103,691	6,941	694.1	110,632	21,232	16.1%	131,864
1990	102,645	7,539	753.9	110,184	21,399	16.3%	131,583
1991	99,304	8,644	864.4	107,948	20,676	16.1%	128,624
1992	102,119	8,831	883.1	110,950	21,988	16.5%	132,938
1993	103,417	10,287	978.8	113,704	23,490	17.1%	137,194
1994	103,997	11,010	1,042.0	115,007	25,124	17.9%	140,131
1995	103,968	13,093	1,213.7	117,061	26,206	18.3%	143,267
1996	107,390	12,125	1,076.1	119,515	27,160	18.5%	146,675
				<i>Average annual percentage change</i>			
1973-96	d	d	d	0.8%	4.5%		1.2%
1986-96	0.9%	4.1%	3.3%	1.1%	4.0%		1.6%

Source:

U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 1996*, Washington, DC, 1997, Tables MF-21 and MF-33E, pp. I-3, I-6, and annual. (Additional resources: <http://www.fhwa.dot.gov>)

^a Estimated for 1980-92 as 10% of gasohol consumption.
^b Special fuels consist primarily of diesel fuel, with small quantities of liquified petroleum gas.
^c Data for gasoline and gasohol cannot be separated in this year.
^d Data are not available.

Figure 2.1. Motor Gasoline Quantities by Type, 1981 and 1996



ORNL-DWG 98-5494

Source:

U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual 1996*, Washington, DC, Tables 17 and 20.

U.S. Department of Energy, Energy Information Administration, *The Motor Gasoline Industry: Past, Present and Future*, Washington, DC, Table 5.

U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 1996*, Washington, DC, Tables MF-21 and MF-33E, and annual.





Table 2.10
Alternative Vehicle Fuel Consumption, 1992-98
(thousand gasoline equivalent gallons)

Alternative fuel	1992	1993	1994	1995	1996	1997	1998 ^a
Liquified petroleum gas	208,142	264,655	248,467	232,701	239,158	244,612	252,981
Compressed natural gas	16,823	21,603	24,160	35,162	46,923	63,258	74,998
Liquified natural gas	585	1,900	2,345	2,759	3,247	4,567	5,090
M85 ^b	1,069	1,593	2,340	2,887	3,390	3,625	3,832
M100	2,547	3,166	3,190	2,150	347	347	347
E85 ^b	21	48	80	190	694	1,416	1,614
E95 ^b	85	80	140	995	2,699	2,628	2,628
Electricity	359	288	430	663	773	936	1,067
Subtotal	229,631	293,334	281,152	277,507	297,231	321,389	342,557
Oxygenates							
MTBE ^c	1,175,000	2,069,200	2,018,800	2,691,200	2,749,700	2,923,700	2,840,800
Ethanol in gasohol	701,000	760,000	845,900	910,700	660,200	787,800	852,500
Total	2,105,631	3,122,534	3,145,852	3,879,407	3,707,131	4,032,889	4,035,857

Source:

U.S. Department of Energy, Energy Information Administration, *Alternatives to Traditional Transportation Fuels, 1996*, Washington, DC, December 1997, p. 20. (Additional resources: <http://www.eia.doe.gov>)

^aBased on plans or projections.

^bConsumption includes gasoline portion of the mixture.

^cMethyl Tertiary Butyl Ether. This category includes a very small amount of other ethers, primarily Tertiary Amyl Methyl Ether (TAME) and Ethyl Tertiary Butyl Ether (ETBE).

Table 2.11
U.S. Production of MTBE^a and Fuel Ethanol, 1978-97
(million gallons)

Year	Fuel ethanol	MTBE ^a
1978	20	b
1979	40	b
1980	80	b
1981	85	122
1982	234	132
1983	443	134
1984	567	235
1985	793	302
1986	798	359
1987	825	b
1988	800	b
1989	750	b
1990	756	b
1991	875	b
1992	1,080	1,542
1993	1,156	2,081
1994	1,280	2,205
1995	1,355	2,506
1996	974	2,846
1997	1,274	3,011
<i>Average annual percentage change</i>		
1978-97	24.4%	b
1987-97	4.4%	b

Source:

1992-97 Ethanol and MTBE - U.S. Department of Energy,
 Energy Information Administration, *Petroleum
 Supply Monthly*, January 1998, Table D1.
 1978-90 Ethanol - Information Resources, Inc.,
 Washington, DC, 1991.
 1981-86 MTBE - EA-Mueller, Inc., Baltimore, MD, 1992.

^aMethyl tertiary-butyl ether.

^bData are not available.





Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences between the transportation modes in the nature of services, routes available, and many additional factors, it is not possible to obtain truly comparable national energy intensities among modes.

Table 2.12
Passenger Travel and Energy Use in the United States, 1996

	Number of vehicles (thousands)	Vehicle- miles (millions)	Passenger- miles (millions)	Load factor (persons/vehicle)	Energy intensities		Energy use (trillion Btu)
					(Btu per vehicle-mile)	(Btu per passenger-mile)	
Automobiles	129,728.3	1,467,703	2,348,325	1.6	5,874	3,671	8,620.8
Personal trucks	52,028.0	573,903	918,245	1.6	7,040	4,400	4,040.2
Motorcycles	3,871.2	9,906	11,887	1.2	2,504	2,086	24.8
Buses	657.3	8,385	146,160	17.4	21,050	1,208	176.5
Transit	67.8	2,165	18,860	8.7	39,261	4,507	85.0
Intercity	20.1	1,220	28,300	23.2	18,394 ^a	816 ^a	23.1 ^a
School	569.4	5,000	99,000	19.8	13,680 ^a	691 ^a	68.4 ^a
Air	^b	7,871	445,068	56.5	239,385	4,234	1,884.2
Certificated route	^b	4,809	434,468	90.3	368,705	4,081	1,773.1
General aviation	187.3	3,062 ^c	10,600	3.5	36,284	10,481	111.1
Recreational boats	11,877.9	^b	^b	^b	^b	^b	289.2
Rail	17.8	1,101	25,921	23.5	71,753	3,048	79.0
Intercity ^d	1.8 ^c	278 ^f	5,066 ^g	18.2	43,525	2,389	12.1 ^a
Transit ^h	11.3	581	12,484	21.5	74,010	3,444	43.0
Commuter	4.7	242	8,371	34.6	98,760	2,855	23.9

Source:

See Appendix A for Table 2.12.

^aEstimated using vehicle travel data.

^bData are not available.

^cNautical miles.

^dAmtrak only.

^eSum of passenger train cars and locomotive units.

^fPassenger train car-miles.

^gRevenue passenger miles.

^hLight and heavy rail.

Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences between the transportation modes in the nature of services, routes available, and many additional factors, it is not possible to obtain truly comparable national energy intensities among modes.

Table 2.13
Intercity Freight Movement and Energy Use in the United States, 1996

	Number of vehicles (thousands)	Vehicle-miles (millions)	Ton-miles (millions)	Tons shipped (millions)	Average length of haul (miles)	Energy intensity (Btu/ton-mile)	Energy use (trillion Btu)
Truck^a	1,888	113,632	986,000	3,578	668^b	2,790	2,750.7
Waterborne commerce^c	41	^d	764,686	1,093	699	412	314.9
Coastwise	^d	^d	408,086	267	1,526	^d	^d
Lakewise	^d	^d	58,335	115	508	^d	^d
Internal and local	^d	^d	298,264	711	419	^d	^d
Pipeline	^d	^d	^d	1,748	^d	^d	929.8
Natural gas	^d	^d	^d	571	^d	^d	771.4
Crude oil and products	^d	^d	631,000	1,177	^d	251	158.4
Class I railroads^e	571	31,715	1,355,975	2,229	842	368	499.4

Source:

See Appendix A for Table 2.13.

^aThe definition of intercity truck was "tightened" to exclude smaller trucks. See Appendix A for details.

^b668 miles is for general freight (less than truckload). Based on data from the Eno Transportation Foundation, the average length of haul for specialized freight (truckload) was 301 miles.

^cIncludes commerce by foreign and domestic carriers in the U.S.

^dData are not available.

^eRailroad measures are: number vehicles = number freight cars, vehicle-miles = car-miles, ton-miles = revenue ton-miles.





Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences between the transportation modes in the nature of services, routes available, and many additional factors, it is not possible to obtain truly comparable national energy intensities among modes.

Table 2.14
Energy Intensities of Passenger Modes, 1970-96

Year	Automobiles		Light truck ^a (Btu per vehicle-mile)	Buses			Air		Rail			
	(Btu per vehicle-mile)	(Btu per passenger-mile)		Transit ^b		Intercity (Btu per passenger-mile)	School (Btu per vehicle-mile)	Certificated air carriers (Btu per passenger-mile)	General aviation (Btu per passenger-mile)	Intercity Amtrak (Btu per passenger-mile)	Rail transit (Btu per passenger-mile)	
			(Btu per vehicle-mile)	(Btu per passenger-mile)								
1970	9,301	4,896	12,492	31,796	2,472	1,051	17,857	10,351	10,374	c	2,453	
1975	9,015	4,745	11,890	33,748	2,814	976	17,040	7,883	10,658	3,677	2,962	
1976	9,130	4,805	11,535	34,598	2,896	996	17,051	7,481	10,769	3,397	2,971	
1977	8,961	4,716	11,171	35,120	2,889	961	16,983	7,174	11,695	3,568	2,691	
1978	8,844	4,655	10,815	36,603	2,883	953	17,018	6,333	11,305	3,683	2,210	
1979	8,647	4,551	10,473	36,597	2,795	963	16,980	5,858	10,787	3,472	2,794	
1980	7,915	4,166	10,230	36,553	2,813	1,069	16,379	5,837	11,497	3,176	3,008	
1981	7,672	4,038	10,001	37,745	3,027	1,155	16,385	5,743	11,123	2,957	2,946	
1982	7,485	3,939	9,275	38,766	3,237	1,149	16,296	5,147	13,015	3,156	3,069	
1983	7,376	4,098	9,141	37,962	3,177	1,174	16,236	5,107	11,331	2,957	3,212	
1984	7,218	4,010	8,945	37,507	3,204	1,247	14,912	5,031	11,454	3,027	3,732	
1985	7,182	3,990	8,754	38,862	2,421	1,324	16,531	5,679	11,707	2,800	3,461	
1986	7,213	4,007	8,578	39,869	3,512	869	15,622	5,447	11,935	2,574	3,531	
1987	6,975	3,875	8,376	38,557	3,542	939	15,615	4,753	11,496	2,537	3,534	
1988	6,700	3,722	8,155	39,121	3,415	965	15,585	4,814	11,794	2,462	3,585	
1989	6,602	3,668	7,779	36,583	3,711	963	15,575	4,796	10,229	2,731	3,397	
1990	6,183	3,864	7,774	36,647	3,735	944	16,368	4,811	10,146	2,609	3,453	
1991	5,925	3,703	7,381	36,939	3,811	978	16,419	4,560	9,869	2,503	3,710	
1992	5,970	3,731	7,263	40,472	4,303	978	16,386	4,482	9,785	2,610	3,575	
1993	6,103	3,814	7,208	39,005	4,257	972	19,093	4,304	9,653	2,646	3,687	
1994	6,041	3,775	7,232	40,102	4,604	876	20,591	4,455	9,163	2,351	3,828	
1995	5,923	3,702	7,237	40,175	4,650	816	13,680	4,236	10,152	2,314	3,818	
1996	5,874	3,671	7,247	39,307	4,512	816	13,680	4,081	10,481	2,389	3,444	
				<i>Average annual percentage change</i>								
1970-96	-1.8%	-1.1%	-2.1%	0.8%	2.3%	-1.0%	-1.0%	-3.5%	0.0%	-2.0% ^d	1.3%	
1986-96	-2.0%	-0.9%	-1.7%	-0.1%	2.5%	-0.6%	-1.3%	-2.8%	-1.3%	-0.7%	-0.2%	

Source:
See Appendix A for Table 2.14.

^aAll two-axle, four-tire trucks.

^bSeries not continuous between 1983 and 1984 because of a change in data source by the American Public Transit Association (APTA).

^cData are not available.

^dAverage annual percentage change is for years 1973-95.

Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences between the transportation modes in the nature of services, routes available, and many additional factors, it is not possible to obtain truly comparable national energy intensities among modes.

Table 2.15
Energy Intensities of Freight Modes, 1970-96

Year	Heavy single-unit and combination trucks (Btu per vehicle-mile)	Class I freight railroad		Domestic waterborne commerce (Btu per ton-mile)
		(Btu per freight car-mile)	(Btu per ton-mile)	
1970	24,154	17,668	691	545
1971	23,694	18,814	717	506
1972	23,871	18,292	714	522
1973	23,977	18,468	677	576
1974	23,983	18,852	681	483
1975	23,836	18,741	687	549
1976	23,773	18,938	680	468
1977	23,873	19,225	669	458
1978	24,013	18,930	641	383
1979	24,260	19,187	618	457
1980	24,431	18,742	597	358
1981	24,892	18,628	572	360
1982	24,296	18,403	553	310
1983	23,740	17,863	525	319
1984	23,363	17,797	510	346
1985	23,015	17,500	497	446
1986	22,917	17,265	486	463
1987	22,391	16,791	456	402
1988	22,586	16,758	443	361
1989	22,391	16,896	437	403
1990	22,765	16,618	420	388
1991	22,710	15,834	391	386
1992	22,559	16,044	393	398
1993	22,308	16,055	389	389
1994	22,159	16,338	388	369
1995	22,172	15,993	372	374
1996	21,964	15,747	368	412
<i>Average annual percentage change</i>				
1970-96	-0.4%	-0.4%	-2.4%	-1.1%
1986-96	-0.4%	-0.9%	-2.7%	-1.2%

Source:

See Appendix A for Table 2.15.



