

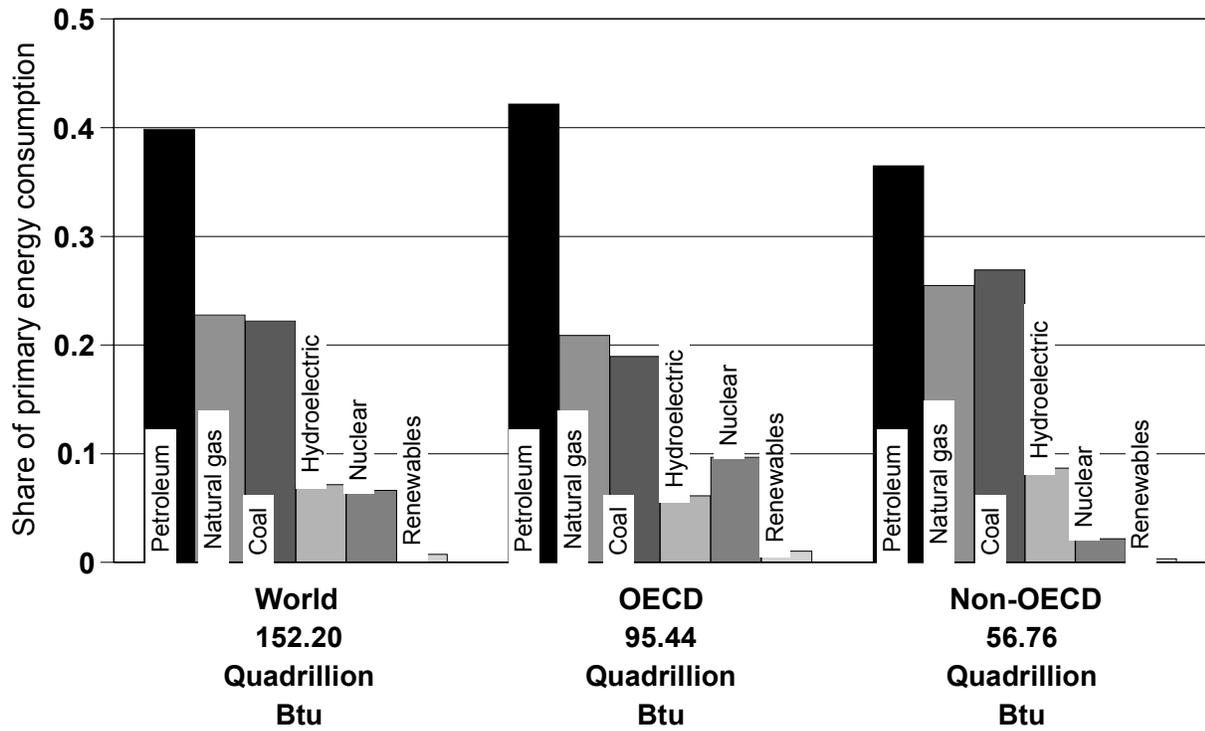
Chapter 2 Energy

Summary Statistics from Tables in this Chapter

Source			
Table 2.1	Transportation share of U.S. energy consumption, 2000	27.0%	
Table 2.2	Petroleum share of transportation energy consumption, 1999	96.4%	
Table 2.3	Alternative fuel and oxygenate consumption, 2000		
		(thousand gasoline equivalent gallons)	(share)
	<i>Liquified petroleum gas</i>	242,695	5.4%
	<i>Compressed natural gas</i>	86,286	2.2%
	<i>Liquified natural gas</i>	6,847	0.2%
	<i>M85/M100</i>	1,433	0.0%
	<i>E85/E95</i>	3,398	0.1%
	<i>Electricity</i>	1,819	0.0%
	<i>MTBE</i>	3,104,200	69.4%
	<i>Ethanol in gasohol</i>	1,011,800	22.6%
Table 2.4	Transportation energy use by mode, 1999	(trillion Btu)	(share)
	<i>Automobiles</i>	9,126	34.2%
	<i>Light trucks</i>	6,617	24.8%
	<i>Heavy trucks</i>	4,563	17.1%
	<i>Buses</i>	208	0.8%
	<i>Air</i>	2,546	9.5%
	<i>Water</i>	1,300	4.9%
	<i>Pipeline</i>	1,009	3.8%
	<i>Rail</i>	607	2.3%
	<i>Off-highway</i>	680	2.5%

Petroleum accounted for 40% of the world's energy use in 1999. Though petroleum is the dominant energy source for both OECD countries and non-OECD countries, the non-OECD countries rely on coal, natural gas, and hydroelectric power more than OECD countries do.

Figure 2.1. World Consumption of Primary Energy, 1999



Source:

U.S. Department of Energy, Energy Information Administration, *International Energy Annual 1999*, Washington, DC, February 2001, Table 1.8.

The Energy Information Administration revised the historical energy data series to include renewable energy in each sector. Also, the residential and commercial sector data are now separated. Total energy use was 99 quads in 2000 with transportation using 27%.

Table 2.1
U. S. Consumption of Total Energy by End-Use Sector, 1973–2000^a
(quadrillion Btu)

Year	Transportation	Percentage transportation of total	Industrial	Commercial	Residential	Total
1973	18.6	24.6%	32.7	9.5	15.0	75.8
1974	18.1	24.5%	31.8	9.4	14.7	74.1
1975	18.2	25.3%	29.4	9.5	14.9	72.0
1976	19.1	25.1%	31.4	10.0	15.5	76.1
1977	19.8	25.4%	32.3	10.2	15.8	78.1
1978	20.6	25.7%	32.8	10.5	16.2	80.1
1979	20.5	25.3%	34.0	10.6	15.9	81.0
1980	19.7	25.1%	32.2	10.6	15.9	78.4
1981	19.5	25.5%	30.9	10.7	15.5	76.6
1982	19.1	26.0%	27.8	10.9	15.7	73.4
1983	19.1	26.1%	27.6	11.0	15.6	73.3
1984	19.8	25.7%	29.7	11.5	15.9	77.0
1985	20.1	26.1%	29.1	11.6	16.1	76.8
1986	20.8	27.0%	28.5	11.7	16.1	77.1
1987	21.5	26.9%	29.7	12.1	16.4	79.6
1988	22.3	26.9%	30.9	12.6	17.2	83.1
1989	22.6	26.7%	31.2	13.1	17.8	84.6
1990	22.5	26.8%	31.7	13.1	16.8	84.2
1991	22.1	26.3%	31.3	13.4	17.4	84.2
1992	22.5	26.3%	32.5	13.3	17.3	85.5
1993	22.9	26.2%	32.7	13.6	18.1	87.3
1994	23.5	26.4%	33.7	13.9	18.1	89.2
1995	24.0	26.4%	34.1	14.4	18.5	90.9
1996	24.5	26.1%	35.0	14.9	19.5	93.9
1997	24.8	26.3%	35.2	15.4	18.9	94.3
1998	25.4	26.8%	34.9	15.5	18.8	94.5
1999	26.3	27.1%	35.7	15.9	19.2	97.1
2000	26.7	27.0%	36.1	16.3	19.7	98.8
		<i>Average annual percentage change</i>				
1973–2000	1.3%		0.4%	2.0%	1.0%	1.0%
1990–2000	1.7%		1.3%	2.2%	1.6%	1.6%

Source:

U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, March 2001, Washington, DC, Table 2.2. (Additional resources: www.eia.doe.gov)

^aElectrical energy losses have been distributed among the sectors.

The Energy Information Administration revised the historical energy data series to include renewable energy in each sector. Also, the residential and commercial data, which were previously one category, are now separate. In transportation, the alcohol fuels blended into gasoline to make gasohol are now counted under “renewables.”

Table 2.2
Distribution of Energy Consumption by Source, 1973 and 2000
(percentage)

Energy source	Transportation		Residential		Commercial		Industrial		Electric utilities	
	1973	2000	1973	2000	1973	2000	1973	2000	1973	2000
Petroleum	95.8	96.4	18.9	7.4	16.4	4.1	27.9	25.4	17.7	2.2
Natural gas ^a	4.0	2.9	33.2	25.2	27.8	20.4	31.8	30.3	18.8	8.6
Coal	0.0	0.0	0.7	2.2	1.6	3.9	12.4	6.4	43.5	55.5
Renewable	0.0	0.5	2.4	2.4	0.1	0.4	3.6	6.3	15.4	11.5
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	22.2
Electricity ^b	0.2	0.2	44.9	62.9	54.1	71.2	24.4	31.6	0.0	0.0
Other ^c	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total	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 2001, Washington, DC, pp. 27, 29, 31, 33. (Additional resources: 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.

Oxygenates are blended with gasoline to be used in conventional vehicles. The amount of oxygenate use dwarfs the alternative fuel use. Gasoline-equivalent gallons are used in this table to allow comparisons of different fuel types.

Table 2.3
Alternative Fuel and Oxygenate Consumption, 1992–2001
(thousand gasoline–equivalent gallons)

Alternative fuel	1992	1995	1998	1999	2000	2001 ^a	2001 Percentage
Liquified petroleum	208,142	232,701	241,583	242,141	242,695	243,196	5.6%
Compressed natural gas	16,823	35,162	73,251	86,286	97,568	107,476	2.5%
Liquified natural gas	585	2,759	5,343	5,828	6,847	7,566	0.2%
M85 ^b	1,069	2,023	1,212	1,073	996	918	0.0%
M100	2,547	2,150	449	447	437	406	0.0%
E85 ^b	21	190	1,727	2,075	3,344	4,575	0.0%
E95 ^b	85	995	59	59	54	51	0.0%
Electricity ^c	359	663	1,202	1,431	1,819	2,143	0.0%
Subtotal	229,631	276,643	324,826	339,340	353,760	366,331	8.4%
Oxygenates							
MTBE ^d	1,175,000	2,691,200	2,903,400	3,331,000	3,104,200	2,937,500	67.2%
Ethanol in gasohol	701,000	910,700	889,500	956,900	1,011,800	1,066,000	24.4%
Total	2,105,631	3,878,543	4,117,726	4,627,240	4,469,760	4,369,831	100.0%

Source:

U.S. Department of Energy, Energy Information Administration, *Alternatives to Traditional Transportation Fuels, 1999*, Washington, DC, 2000, web site www.eia.doe.gov/cneaf/alternate/page/datatables/atf1-13_00.html, Table 10. (Additional resources: www.eia.doe.gov)

^aBased on plans or projections.

^bConsumption includes gasoline portion of the mixture.

^cVehicle consumption only; does not include power plant inputs.

^dMethyl 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).

As data about alternative fuel use become available, an attempt is made to incorporate them into this table. Sometimes assumptions must be made in order to use the data. Please see Appendix A for a description of the methodology used to develop these data.

Table 2.4
Domestic Consumption of Transportation Energy by Mode and Fuel Type, 1999^a
(trillion Btu)

	Gasoline	Diesel fuel	Liquified petroleum gas	Jet fuel	Residual fuel oil	Natural gas	Electricity	Methanol
<u>HIGHWAY</u>	15,958.3	4,549.1	25.2			6.4	0.9	0.1
Light vehicles	15,430.2	330.1	9.6			0.0		0.0
Automobiles	9,044.9 ^b	81.2				0.0		0.0
Light trucks ^c	6,358.9	248.9	9.6			0.0		0.0
Motorcycles	26.4							
Buses	11.0	188.5	0.5			6.4	0.9	0.1
Transit	4.1	85.7	0.5			6.4	0.9	0.1
Intercity		33.4						
School	6.9	69.4						0.0
Medium/heavy trucks	517.1	4,030.5	15.1			0.0		0.0
<u>OFF-HIGHWAY</u>	110.0	570.1^d						
Construction	22.2	178.5^d						
Agriculture	87.8	391.6^d						
<u>NONHIGHWAY</u>	351.6	835.6		2,504.1	694.6	757.9	317.0	
Air	41.5			2,504.1				
General aviation	41.5			130.6				
Domestic air carriers				2,004.0				
International air				369.5				
Water	310.1	294.8			694.6			
Freight		294.8			694.6			
Recreational	310.1							
Pipeline						757.9	251.3	
Rail		540.8					65.7	
Freight (Class I)		520.1						
Passenger		20.7					65.7	
Transit							44.7	
Commuter		10.1					15.5	
Intercity ^e		10.6					5.5	
TOTAL	16,419.9	5,954.8	25.2	2,504.1	694.6	764.3	317.9	0.1

Source:

See Appendix A for Table 2.4

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

^b Includes gasohol.

^c Two-axle, four-tire trucks.

^d 1985 data.

The 1998 data have been revised to include the latest data available.

Table 2.5
Transportation Energy Use by Mode, 1998–99^a

	Trillion Btu		Thousand barrels per day crude oil equivalent ^b		Percentage of total	
	1998	1999	1998	1999	1998	1999
HIGHWAY	19,871.3	20,540.0	9,996.7	10,333.1	77.2%	77.0%
Light vehicles	15,296.8	15,769.9	7,695.4	7,933.4	59.4%	59.1%
Automobiles	8,943.3	9,126.1	4,499.1	4,591.1	34.7%	34.2%
Light trucks ^c	6,327.8	6,617.3	3,183.3	3,329.0	24.6%	24.8%
Motorcycles	25.7	26.4	12.9	13.3	0.1%	0.1%
Buses	201.5	207.4	101.4	104.3	0.8%	0.8%
Transit	95.4	97.7	48.0	49.2	0.4%	0.4%
Intercity	30.5	33.4	15.3	16.8	0.1%	0.1%
School	75.6	76.3	38.0	38.4	0.3%	0.3%
Medium/heavy trucks	4,373.0	4,562.7	2,199.9	2,295.4	17.0%	17.1%
OFF-HIGHWAY	712.7	680.1	358.5	342.1	2.8%	2.5%
Construction	207.8	200.7	104.5	101.1	0.8%	0.8%
Agriculture	504.9	479.4	254.0	241.2	2.0%	1.8%
NONHIGHWAY	5,156.0	5,460.8	2,593.8	2,747.2	20.0%	20.5%
Air	2,370.8	2,545.6	1,192.7	1,280.6	9.2%	9.5%
General aviation	147.4	172.1	74.2	86.6	0.6%	0.6%
Domestic air carriers	1,853.4	2,004.0	942.5	1,008.2	7.3%	7.5%
International air	350.0	369.5	176.1	185.9	1.4%	1.4%
Water	1,295.3	1,299.5	651.6	653.7	5.0%	4.9%
Freight	989.4	989.4	497.7	497.7	3.8%	3.7%
Recreational	305.9	310.1	153.9	156.0	1.2%	1.2%
Pipeline	901.2	1,009.2	453.4	507.7	3.5%	3.8%
Rail	588.7	606.5	296.2	305.1	2.3%	2.3%
Freight	502.0	520.1	252.5	261.6	2.0%	1.9%
Passenger	86.7	86.4	43.6	43.5	0.3%	0.3%
Transit	43.1	44.7	21.7	22.5	0.2%	0.2%
Commuter	28.2	25.6	14.2	12.9	0.1%	0.1%
Intercity	15.4	16.1	7.7	8.1	0.1%	0.1%
TOTAL	25,740.0	26,680.9	12,949.1	13,422.4	100%	100.0%

Source: See Appendix A for Table 2.4 (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.

^cTwo-axle, four-tire trucks.

The highway sector is by far the largest part of transportation energy use. Light truck energy use has increased at the greatest rate, due to the increased use of light trucks as personal passenger vehicles. Light trucks include pick-ups, minivans, sport-utility vehicles, and vans.

Table 2.6
Highway Transportation Energy Consumption by Mode, 1970–99
(trillion Btu)

Year	Autos	Light trucks	Light vehicles subtotal	Motor-cycles	Buses ^a	Heavy trucks	Highway subtotal	Total transportation ^b
1970	8,527	1,540	10,067	7	128	1,503	11,686	15,289
1975	9,321	2,386	11,707	14	124	1,939	13,779	17,302
1976	9,844	2,605	12,449	15	134	2,046	14,639	18,361
1977	9,940	2,799	12,739	16	137	2,268	15,155	19,045
1978	10,140	3,022	13,162	18	141	2,539	15,854	20,002
1979	9,629	3,057	12,686	22	144	2,644	15,489	20,065
1980	8,798	2,976	11,774	26	143	2,651	14,590	19,280
1981	8,695	2,964	11,659	27	145	2,706	14,535	19,016
1982	8,695	2,839	11,534	25	151	2,707	14,412	18,511
1983	8,814	2,995	11,809	22	152	2,757	14,733	18,645
1984	8,857	3,202	12,059	22	144	2,846	15,081	19,268
1985	8,954	3,422	12,376	23	154	2,842	15,402	19,636
1986	9,162	3,636	12,798	23	160	2,903	15,878	20,157
1987	9,179	3,827	13,006	24	163	2,990	16,177	20,657
1988	9,180	4,095	13,275	25	165	3,117	16,577	21,269
1989	9,251	4,173	13,424	26	169	3,196	16,809	21,562
1990	8,707	4,466	13,173	24	166	3,329	16,690	21,656
1991	8,048	4,793	12,841	23	176	3,396	16,434	21,254
1992	8,188	5,133	13,321	24	184	3,460	16,988	21,925
1993	8,389	5,374	13,763	25	183	3,567	17,548	22,419
1994	8,494	5,529	14,023	26	189	3,772	18,024	22,995
1995	8,519	5,717	14,236	25	189	3,950	18,390	23,565
1996	8,622	5,936	14,558	25	192	4,033	18,850	24,068
1997	8,746	6,191	14,937	25	197	4,086	19,244	24,403
1998	8,943	6,328	15,271	26	202	4,373	19,841	24,974
1999	9,126	6,617	15,743	26	208	4,563	20,571	26,033
		<i>Average annual percentage change</i>						
1970–99	0.2%	5.2%	1.6%	4.6%	1.7%	3.9%	2.0%	1.9%
1989–99	-0.1%	4.7%	1.6%	0.0%	2.1%	3.6%	2.0%	1.9%

Source: See Appendix A for Table 2.5.

^a These data have been revised due to revisions of intercity and school bus energy use. Beginning in 1992 data became available on non-diesel 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).

Only 20% of transportation energy use is for nonhighway modes. Air travel accounts for nearly half of nonhighway energy use.

Table 2.7
Nonhighway Transportation Energy Consumption by Mode, 1970–99
(trillion Btu)

Year	Air	Water	Pipeline	Rail	Nonhighway subtotal	Total transportation ^a
1970	1,307	753	985	558	3,603	15,289
1975	1,274	851	835	563	3,523	17,302
1976	1,333	1,001	803	585	3,722	18,361
1977	1,411	1,103	781	595	3,890	19,045
1978	1,467	1,311	781	589	4,148	20,002
1979	1,568	1,539	856	613	4,576	20,065
1980	1,528	1,677	889	596	4,690	19,280
1981	1,455	1,562	899	565	4,481	19,016
1982	1,468	1,290	853	488	4,099	18,511
1983	1,505	1,187	738	482	3,912	18,645
1984	1,633	1,251	780	523	4,187	19,268
1985	1,678	1,311	758	487	4,234	19,636
1986	1,823	1,295	738	423	4,279	20,157
1987	1,894	1,326	775	485	4,480	20,657
1988	1,978	1,338	878	498	4,692	21,269
1989	1,981	1,376	895	501	4,753	21,562
1990	2,059	1,487	928	492	4,966	21,656
1991	1,926	1,567	864	463	4,820	21,254
1992	1,971	1,641	849	476	4,937	21,925
1993	1,996	1,473	889	513	4,871	22,419
1994	2,056	1,414	955	546	4,971	22,995
1995	2,117	1,522	971	565	5,175	23,565
1996	2,196	1,460	984	578	5,218	24,068
1997	2,284	1,309	987	579	5,159	24,403
1998	2,351	1,295	901	586	5,133	24,974
1999	2,546	1,300	1,009	607	5,462	26,033
	<i>Average annual percentage change</i>					
1970–99	2.3%	1.9%	0.1%	0.3%	1.4%	1.9%
1989–99	2.5%	-0.6%	1.2%	1.9%	1.4%	1.9%

Source:

See Appendix A for Table 2.5.

^a 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%. See Table 2.3 for details on oxygenate usage.

Table 2.8
Highway Usage of Gasoline and Special Fuels, 1973–99
(billion gallons)

Year	Gasoline	Gasohol	Ethanol used in gasohol ^a	Total gasoline and gasohol	Diesel ^b	Percent diesel	Total highway fuel use	
1973	c	c	c	100.6	9.8	8.9%	110.5	
1975	c	c	c	99.4	9.6	8.8%	109.0	
1980	100.7	0.5	0.0	101.2	13.8	12.0%	115.0	
1981	98.9	0.7	0.1	99.6	14.9	13.0%	114.5	
1982	96.2	2.3	0.2	98.5	14.9	13.1%	113.4	
1983	95.9	4.3	0.4	100.1	16.0	13.8%	116.1	
1984	96.0	5.4	0.5	101.4	17.3	14.6%	118.7	
1985	95.6	8.0	0.8	103.6	17.8	14.6%	121.3	
1986	98.6	8.1	0.8	106.8	18.4	14.7%	125.2	
1987	101.8	6.9	0.8	108.7	19.0	14.9%	127.7	
1988	101.7	8.1	0.8	109.8	20.1	15.5%	129.9	
1989	103.7	6.9	0.7	110.6	21.2	16.1%	131.9	
1990	102.6	7.5	0.8	110.2	21.4	16.3%	131.6	
1991	99.3	8.6	0.9	107.9	20.7	16.1%	128.6	
1992	102.1	8.8	0.9	111.0	22.0	16.5%	132.9	
1993	103.4	10.3	1.0	113.7	23.5	17.1%	137.2	
1994	104.0	11.0	1.0	115.0	25.1	17.9%	140.1	
1995	104.0	13.1	1.2	117.1	26.2	18.3%	143.3	
1996	107.4	12.1	1.1	119.5	27.2	18.5%	146.7	
1997	106.2	14.7	1.3	120.9	29.4	19.6%	150.3	
1998	110.7	14.0	1.3	124.7	30.2	19.5%	154.9	
1999	114.6	14.2	1.3	128.7	31.9	19.9%	160.7	
			<i>Average annual percentage change</i>					
1973–99	d	d	d	1.0%	4.6%		1.5%	
1989–99	1.0%	7.4%	6.4%	1.5%	4.2%		2.0%	

Source:

U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 1999*, Washington, DC, 2000, Tables MF-21 and MF-33E, and annual.
(Additional resources: www.fhwa.dot.gov)

^a Estimated for 1980–92 as 10% of gasohol consumption.

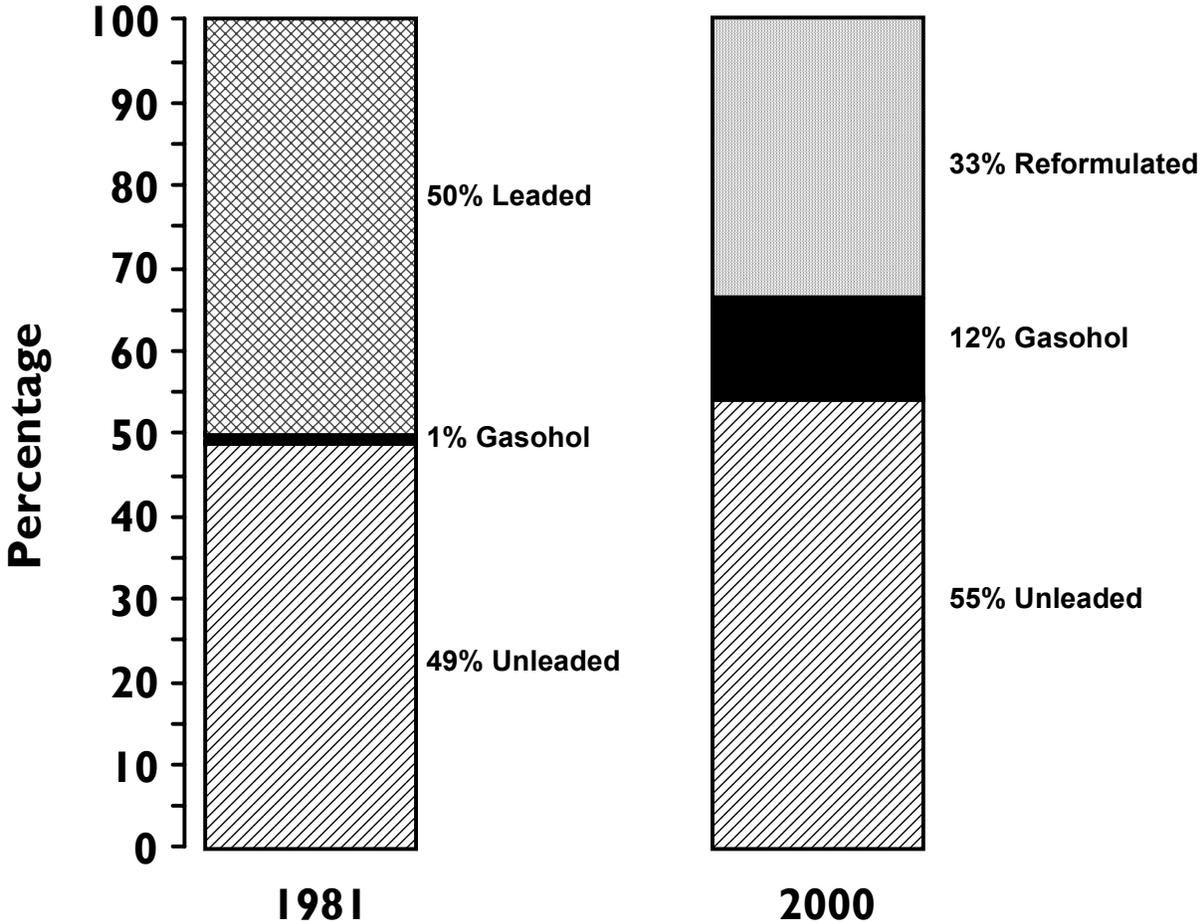
^b Consists primarily of diesel fuel, with small quantities of liquified petroleum gas.

^c Data for gasoline and gasohol cannot be separated in this year.

^d Data are not available.

The types of gasoline supplied today are significantly different than in 1981, mostly due to air quality mandates. The phase-out of leaded gasoline began in 1978 and the phase-in of reformulated gasoline began in 1995.

Figure 2.2. Motor Gasoline Quantities by Type, 1981 and 2000



Source:
 U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual 2000*, Washington, DC, Tables 17 and 20, June 2001.
 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 1999*, Washington, DC, Table MF-33E, and annual.

Note:
 Reformulated gasoline has lower concentrations of certain volatile organic compounds in a formulation intended to reduce ozone-forming hydrocarbons and air toxics. It is required in the worst ozone-nonattainment areas.
 Gasohol category includes all oxygenate blends except reformulated gasoline.
 Unleaded gasoline is now known as conventional gasoline.

Nearly all of the fuel ethanol used in the U.S. is made domestically. One quarter of MTBE was imported in 2000.

Table 2.9
U.S. Production and Imports of MTBE^a and Fuel Ethanol, 1985–2000
(million gallons)

Year	Production		Imports	
	Fuel ethanol	MTBE ^a	Fuel ethanol	MTBE ^a
1985	793	302	b	b
1990	756	b	b	b
1991	875	b	b	b
1992	1,080	1,542	b	b
1993	1,156	2,081	10	306
1994	1,280	2,205	12	595
1995	1,355	2,506	16	692
1996	974	2,846	13	733
1997	1,274	3,011	4	918
1998	1,387	3,151	3	1,040
1999	1,472	3,315	4	1,146
2000	1,633	3,253	5	1,176
	<i>Average annual percentage change</i>			
1985–2000	4.9%	17.2%	b	b
1989–2000	8.0%	b	b	b

Source:

Production - 1992–2000 Ethanol and MTBE: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly*, Washington, DC, January 2001, Table D1. 1985–91 Ethanol: Information Resources, Inc., Washington, DC, 1991. 1985 MTBE: EA-Mueller, Inc., Baltimore, MD, 1992. Imports - U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual, 2000, Volume 1*, Washington, DC, June 2001, Table 20, and annual.

Note:

Table 2.3 displays gasoline-equivalent gallons, which differ from these gallons.

^a Methyl tertiary-butyl ether.

^b Data 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. These values are averages, and there is a great deal of variability even within a mode.

Table 2.10
Passenger Travel and Energy Use in the United States, 1999

	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	132,432.0	1,569,270	2,510,832	1.6	5,815	3,635	9,126.1
Personal trucks	57,984.7	651,484	1,042,374	1.6	7,217	4,511	4,701.7
Motorcycles	4,152.4	10,584	12,701	1.2	2,494	2,079	26.4
Buses	688.1	a	a	a	a	a	207.4
Transit	74.2	2,276	21,205	8.9	42,955	4,802	97.7
Intercity	21.8	a	34,700	a	a	1,128	33.4
School	592.0	a	a	a	a	a	76.3
Air	a	a	528,867	a	a	4,116	2,176.1
Certificated route	a	5,332	515,367	96.6	375,810	3,981	2,004.0
General aviation	219.5	a	13,500	a	a	8,970	172.1
Recreational boats	12,738.3	a	a	a	a	a	310.1
Rail	16.9	1,242	28,163	22.7	69,746	3,075	86.6
Intercity ^b	0.4 ^c	349 ^d	5,289 ^e	15.1	46,374	3,063	16.2 ^f
Transit ^e	11.6	626	14,108	22.5	71,360	3,168	44.7
Commuter	4.9	266	8,766	33.0	96,649	2,932	25.7

Source:

See Appendix A for Table 2.11.

^aData are not available.

^bAmtrak only.

^cPassenger train cars.

^dPassenger train car-miles.

^eRevenue passenger-miles.

^fEstimated using vehicle travel data.

^gLight 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. These values are averages, and there is a great deal of variability even within a mode.

Table 2.11
Energy Intensities of Highway Passenger Modes, 1970–99

Year	Automobiles		Light truck ^a (Btu per vehicle-mile)	Buses		
	(Btu per vehicle-mile)	(Btu per passenger-mile)		Transit ^b		Intercity (Btu per passenger-mile)
				(Btu per vehicle-mile)	(Btu per passenger-mile)	
1970	9,301	4,896	12,492	31,796	2,472	1,674
1975	9,015	4,745	11,890	33,748	2,814	988
1976	9,130	4,805	11,535	34,598	2,896	1,007
1977	8,961	4,716	11,171	35,120	2,889	970
1978	8,844	4,655	10,815	36,603	2,883	976
1979	8,647	4,551	10,473	36,597	2,795	1,028
1980	7,915	4,166	10,230	36,553	2,813	1,082
1981	7,672	4,038	10,001	37,745	3,027	1,051
1982	7,485	3,939	9,275	38,766	3,237	1,172
1983	7,376	4,098	9,141	37,962	3,177	1,286
1984	7,218	4,010	8,945	37,507	3,204	954
1985	7,182	3,990	8,754	38,862	2,421	964
1986	7,213	4,007	8,578	39,869	3,512	870
1987	6,975	3,875	8,376	38,557	3,542	940
1988	6,700	3,722	8,155	39,121	3,415	963
1989	6,602	3,668	7,778	36,583	3,711	964
1990	6,183	3,864	7,773	36,647	3,735	962
1991	5,925	3,703	7,381	36,939	3,811	963
1992	5,969	3,731	7,262	40,243	4,310	964
1993	6,103	3,814	7,207	39,050	4,262	962
1994	6,041	3,775	7,232	40,147	4,609	964
1995	5,923	3,702	7,236	40,009	4,643	964
1996	5,893	3,683	7,269	40,209	4,675	963
1997	5,821	3,638	7,277	41,431	4,744	963
1998	5,771	3,607	7,288	43,888	4,688	963
1999	5,815	3,635	7,343	42,955	4,610	964
			<i>Average annual percentage change</i>			
1970–99	-1.6%	-1.0%	-1.8%	1.0%	2.2%	-1.9%
1989–99	-1.3%	-0.1%	-0.6%	1.6%	2.2%	0.0%

Source:

See Appendix A for Table 2.12.

^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).

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
Energy Intensities of Nonhighway Passenger Modes, 1970–99

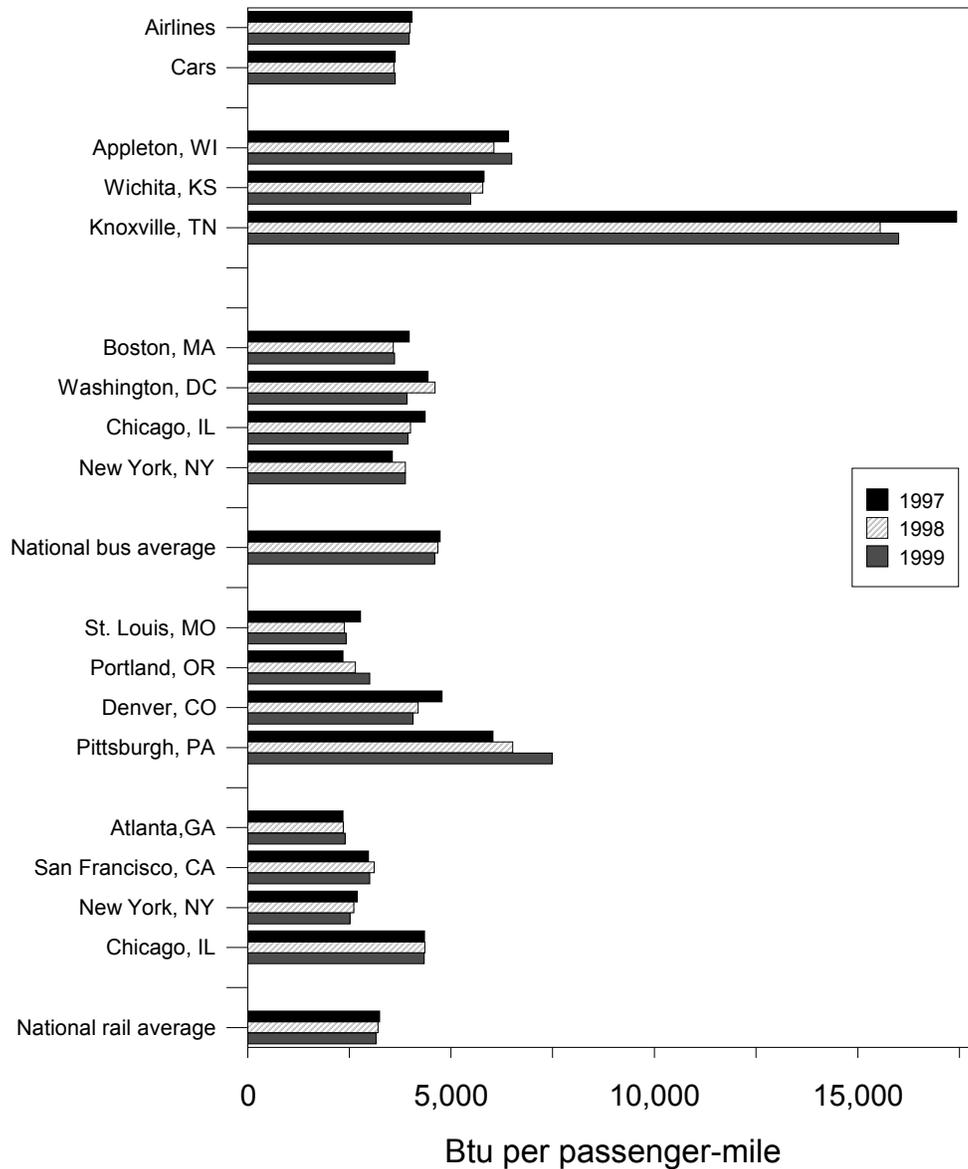
Year	Air		Rail	
	Certificated air carriers (Btu per passenger-mile)	General aviation (Btu per passenger-mile)	Intercity Amtrak (Btu per passenger-mile)	Rail transit (Btu per passenger-mile)
1970	10,351	10,374	^a	2,453
1975	7,883	10,658	3,677	2,962
1976	7,481	10,769	3,397	2,971
1977	7,174	11,695	3,568	2,691
1978	6,333	11,305	3,683	2,210
1979	5,858	10,787	3,472	2,794
1980	5,837	11,497	3,176	3,008
1981	5,743	11,123	2,957	2,946
1982	5,147	13,015	3,156	3,069
1983	5,107	11,331	2,957	3,212
1984	5,031	11,454	3,027	3,732
1985	5,679	11,707	2,800	3,461
1986	5,447	11,935	2,574	3,531
1987	4,751	11,496	2,537	3,534
1988	4,814	11,794	2,462	3,585
1989	4,808	10,229	2,731	3,397
1990	5,006	10,146	2,609	3,453
1991	4,595	9,869	2,503	3,710
1992	4,482	9,785	2,610	3,575
1993	4,558	9,653	2,646	3,687
1994	4,336	9,163	2,351	3,828
1995	4,282	9,870	2,592	3,818
1996	4,096	9,258	2,783	3,444
1997	4,044	9,688	2,923	3,253
1998	3,981	11,252	2,892	3,216
1999	3,889	12,748	3,063	3,168
		<i>Average annual percentage change</i>		
1970–99	-3.3%	0.7%	-0.8% ^b	0.9%
1989–99	-2.1%	2.2%	1.2%	0.7%

Source:

See Appendix A for Table 2.12.

^aData are not available.

^bAverage annual percentage change begins with 1975.

Figure 2.3. Energy Intensity for Transit in the U.S., 1997–99**Source:**

U.S. Department of Transportation, Federal Transit Administration, 1997–1999
 National Transit Databases, Washington, DC.
 (Additional resources: www.fta.dot.gov/ntl)

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, 1999

	Trucks	Waterborne commerce	Class I railroads
Number of vehicles (thousands)	2,561	42	20 ^a
Ton-miles (billions)	1,093,000	656	1,433
Tons shipped (millions)	4,089	1,056	1,717
Average length of haul (miles)	717 ^b	621	835
Energy intensity (Btu/ton-mile)	3,037	457	362
Energy use (trillion Btu)	3,319	300	520

Source:

See Appendix A for Table 2.13.

^a Number of locomotives.

^b 717 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) is 286 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 Freight Modes, 1970–99

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
1997	21,340	15,783	370	415
1998	22,268	15,372	365	436
1999	22,510	15,364	362	457
		<i>Average annual percentage change</i>		
1970–99	-0.2%	-0.5%	-2.2%	-0.6%
1989–99	0.1%	-0.9%	-1.9%	1.3%

Source:

See Appendix A for Table 2.14.