

Chapter 2 Energy

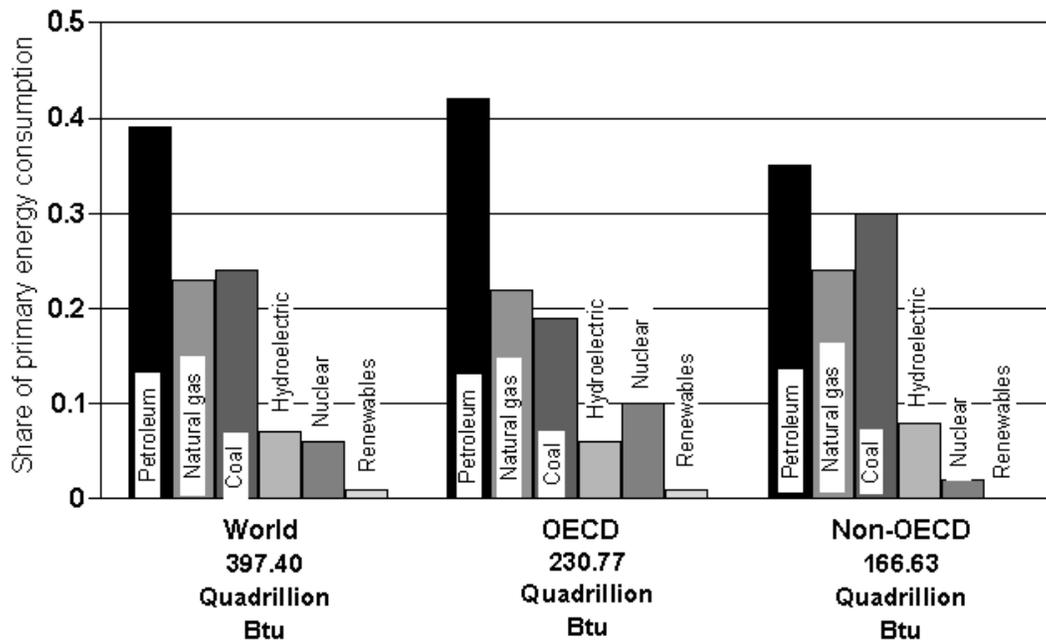
Summary Statistics from Tables in this Chapter

Source			
Table 2.1	Transportation share of U.S. energy consumption, 2001	27.9%	
Table 2.2	Petroleum share of transportation energy consumption, 2001	96.9%	
Table 2.3	Alternative fuel and oxygenate consumption, 2001		
		(thousand gasoline equivalent gallons)	(share)
	<i>MTBE</i>	2,937,500	67.2%
	<i>Ethanol in gasohol</i>	1,066,000	24.4%
	<i>Liquified petroleum gas</i>	243,196	5.6%
	<i>Compressed natural gas</i>	107,476	2.5%
	<i>Liquified natural gas</i>	7,566	0.2%
	<i>E85/E95</i>	4,626	0.0%
	<i>Electricity</i>	2,143	0.0%
	<i>M85/M100</i>	922	0.0%
Table 2.5	Transportation energy use by mode, 2000	(trillion Btu)	(share)
	<i>Automobiles</i>	9,082	33.1%
	<i>Light trucks</i>	6,598	24.0%
	<i>Heavy trucks</i>	4,813	17.5%
	<i>Air</i>	2,549	9.3%
	<i>Water</i>	1,720	6.3%
	<i>Off-highway</i>	944	3.4%
	<i>Pipeline</i>	911	3.3%
	<i>Rail</i>	605	2.2%
	<i>Buses</i>	211	0.8%



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, 2000



Source:

U.S. Department of Energy, Energy Information Administration, *International Energy Annual 2000*, Washington, DC, February 2002, 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 97 quads in 2001 with transportation using 27.9%.

Table 2.1
U. S. Consumption of Total Energy by End-Use Sector, 1973–2001^a
 (quadrillion Btu)

Year	Transportation	Percentage of total transportation	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	26.2	26.8%	35.5	15.8	19.2	97.8
2000	27.0	27.3%	35.7	16.3	19.8	98.8
2001	27.1	27.9%	34.0	16.6	19.4	97.0
<i>Average annual percentage change</i>						
1973–2000	1.4%		0.1%	2.1%	1.0%	0.9%
1990–2000	1.9%		0.7%	2.4%	1.1%	1.4%

Source:

U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, March 2002, 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. In transportation, the alcohol fuels blended into gasoline to make gasohol are now counted under “renewables” and have been taken out of petroleum. The petroleum category, however, still contains other blending agents that are not actually petroleum, but are not broken out into a separate category.

Table 2.2
Distribution of Energy Consumption by Source, 1973 and 2001
(percentage)

Energy source	Transportation		Residential		Commercial		Industrial		Electric utilities	
	1973	2001	1973	2001	1973	2001	1973	2001	1973	2001
Petroleum ^a	95.8	96.9	18.9	7.6	16.4	4.4	27.9	26.4	17.7	2.4
Natural gas ^b	4.0	2.3	33.2	25.5	27.8	19.9	31.8	31.0	18.8	7.8
Coal	0.0	0.0	0.7	0.2	1.6	0.4	12.4	6.5	43.5	56.6
Renewable	0.0	0.5	2.4	2.6	0.1	0.4	3.6	5.9	15.4	9.9
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	23.3
Electricity ^c	0.2	0.2	44.9	64.1	54.1	47.9	24.4	30.2	0.0	0.0
Other ^d	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 2002, Washington, DC, pp. 27, 29, 31, 33. (Additional resources: www.eia.doe.gov)

^a In transportation, the petroleum category contains some blending agents which are not petroleum.

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

^c Includes electrical system energy losses.

^d 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	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)

Note:

These data were released in October 1999. Please check the source web site for updates which were not available when this document went to press.

^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, 2000^a
(trillion Btu)

	Gasoline	Diesel fuel	Liquified petroleum gas	Jet fuel	Residual fuel oil	Natural gas	Electricity	Methanol	Total
HIGHWAY	15,952.3	4,742.2	26.1			8.2	0.9	0.0	20,729.7
Light vehicles	15,396.2	299.7	9.6			0.0		0.0	15,705.5
Automobiles	9,031.1 ^b	50.6				0.0		0.0	9,081.7
Light trucks ^c	6,338.9 ^b	249.1	9.6			0.0		0.0	6,597.6
Motorcycles	26.2								26.2
Buses	10.6	190.9	0.5			8.2	0.9	0.0	211.1
Transit	3.7	88.1	0.5			8.2	0.9	0.0	101.4
Intercity ^d		33.4							33.4
School ^d	6.9	69.4						0.0	76.3
Medium/heavy	545.5	4,251.6	16.0					0.0	4,813.1
OFF-HIGHWAY	105.4	838.3							943.7
Construction	23.9	359.1							383.0
Agriculture	81.5	479.2							560.7
NONHIGHWAY	351.6	825.0		2,508.2	1,120.6	664.4	315.4		5,785.2
Air	40.4			2,508.2					2,548.6
General aviation	40.4			134.7					175.1
Domestic air				2,004.0					2,004.0
International air				369.5					369.5
Water	311.2	288.6			1,120.6				1,720.4
Freight		288.6			1,120.6				1,409.2
Recreational	311.2								311.2
Pipeline						664.4	246.5		910.9
Rail		536.4					68.9		605.3
Freight (Class I)		516.0							516.0
Passenger		20.4					68.9		89.3
Transit							47.2		47.2
Commuter		9.8					16.1		25.9
Intercity ^c		10.6					5.6		16.2
TOTAL	16,409.3	6,405.5	26.1	2,508.2	1,120.6	672.6	316.3	0.0	27,457.7

Source:

See Appendix A for Energy Use Sources.

^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 1999 data. 2000 data are not yet available.



The 1999 data have been revised to include the latest data available.

Table 2.5
Transportation Energy Use by Mode, 1999–2000^a

	Trillion Btu		Percentage of total based on Btus		Thousand barrels per day crude oil equivalent ^b	
	1999	2000	1999	2000	1999	2000
HIGHWAY	20,609.6	20,728.8	76.4%	75.5%	10,549.0	10,607.7
Light vehicles	15,764.7	15,705.5	58.5%	57.2%	8,242.3	8,216.4
Automobiles	9,133.6	9,081.7	33.9%	33.1%	4,780.4	4,756.4
Light trucks ^c	6,604.6	6,597.6	24.5%	24.0%	3,448.1	3,446.3
Motorcycles	26.5	26.2	0.1%	0.1%	13.8	13.7
Buses	207.4	211.1	0.8%	0.8%	94.7	95.6
Transit	97.7	101.4	0.4%	0.4%	42.8	43.7
Intercity	33.4	33.4	0.1%	0.1%	15.7	15.7
School	76.3	76.3	0.3%	0.3%	36.2	36.2
Medium/heavy trucks	4,637.5	4,813.1	17.2%	17.5%	2,212.0	2,295.7
OFF-HIGHWAY	928.6	943.7	3.4%	3.4%	442.5	449.3
Construction	367.6	383.0	1.4%	1.4%	174.1	181.4
Agriculture	561.0	560.7	2.1%	2.0%	268.4	267.9
NONHIGHWAY	5,423.8	5,785.2	20.1%	21.1%	2,125.1	2,283.0
Air	2,470.8	2,548.6	9.2%	9.3%	1,196.3	1,233.9
General aviation	172.1	175.1	0.6%	0.6%	85.6	87.0
Domestic air carriers	1,944.3	2,004.0	7.2%	7.3%	939.5	968.3
International air	354.4	369.5	1.3%	1.3%	171.2	178.6
Water	1,434.6	1,720.4	5.3%	6.3%	661.7	786.4
Freight	1,124.5	1,409.2	4.2%	5.1%	499.9	624.0
Recreational	310.1	311.2	1.2%	1.1%	161.8	162.4
Pipeline	911.8	910.9	3.4%	3.3%	9.9	8.1
Rail	606.6	605.3	2.2%	2.2%	257.2	254.6
Freight	520.0	516.0	1.9%	1.9%	244.6	242.7
Passenger	86.6	89.3	0.3%	0.3%	12.6	11.9
Transit	44.7	47.2	0.2%	0.2%	1.8	1.6
Commuter	25.7	25.9	0.1%	0.1%	5.4	5.1
Intercity	16.2	16.2	0.1%	0.1%	5.4	5.2
TOTAL	26,962.0	27,457.7	100.0%	100.0%	13,116.6	13,340.0

Source: See Appendix A for Energy Use Sources.

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

^b This year, crude oil equivalent is not a simple conversion from Btu based on the average Btu in a barrel of oil. Each gallon of petroleum product was assumed to equal one gallon of crude oil. The oil used to produce electricity is also estimated. See Appendix A, p. 18 for details.

^c Two-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, 1970–2000^a
(trillion Btu)

Year	Autos	Light trucks	Light vehicles subtotal	Motor-cycles	Buses	Heavy trucks	Highway subtotal	Total transportation ^b
1970	8,479	1,539	10,018	7	129	1,553	11,707	15,320
1975	9,298	2,384	11,682	14	124	2,003	13,823	17,356
1976	9,826	2,602	12,428	15	134	2,114	14,691	18,426
1977	9,928	2,797	12,724	16	137	2,344	15,222	19,179
1978	10,134	3,020	13,153	18	141	2,607	15,919	20,120
1979	9,629	3,055	12,685	22	144	2,697	15,547	20,135
1980	8,800	2,975	11,774	26	143	2,686	14,629	18,982
1981	8,693	2,963	11,655	27	145	2,724	14,551	19,121
1982	8,673	2,837	11,510	25	151	2,707	14,393	18,556
1983	8,802	2,989	11,791	22	152	2,770	14,735	18,687
1984	8,837	3,197	12,034	22	146	2,873	15,075	19,317
1985	8,932	3,413	12,345	23	154	2,883	15,404	19,659
1986	9,138	3,629	12,767	23	160	2,958	15,908	20,278
1987	9,157	3,819	12,976	24	164	3,061	16,225	20,741
1988	9,158	4,077	13,235	25	169	3,118	16,548	21,280
1989	9,232	4,156	13,388	26	169	3,199	16,782	21,579
1990	8,688	4,451	13,139	24	167	3,334	16,663	21,689
1991	8,029	4,774	12,803	23	177	3,402	16,405	21,280
1992	8,169	5,117	13,286	24	184	3,468	16,963	21,939
1993	8,368	5,356	13,723	25	183	3,577	17,509	22,396
1994	8,470	5,515	13,984	26	189	3,778	17,976	22,997
1995	8,489	5,695	14,183	25	189	3,937	18,334	23,536
1996	8,634	5,917	14,551	24	192	4,045	18,813	24,042
1997	8,710	6,168	14,879	25	197	4,086	19,187	24,405
1998	8,936	6,305	15,241	26	202	4,218	19,686	24,839
1999	9,134	6,605	15,738	26	208	4,638	20,610	26,033
2000	9,082	6,598	15,679	26	211	4,813	20,730	26,515
<i>Average annual percentage change</i>								
1970–2000	0.2%	5.0%	1.5%	4.5%	1.7%	3.8%	1.9%	1.8%
1990–2000	0.4%	4.0%	1.8%	0.8%	2.4%	3.7%	2.2%	2.0%

Source:

See Appendix A for Highway Energy Use.

^a These data have been revised slightly. See Appendix A for detailed methodologies.

^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).



About 22% 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, 1970–2000^a
(trillion Btu)

Year	Air	Water	Pipeline	Rail	Nonhighway subtotal	Total transportation ^b
1970	1,307	753	995	558	3,614	15,320
1975	1,274	851	844	563	3,533	17,356
1976	1,333	1,010	807	585	3,735	18,426
1977	1,372	1,200	790	595	3,957	19,179
1978	1,417	1,405	787	592	4,201	20,120
1979	1,488	1,626	864	611	4,588	20,135
1980	1,437	1,424	900	592	4,353	18,982
1981	1,455	1,642	909	565	4,570	19,121
1982	1,442	1,378	859	485	4,164	18,556
1983	1,450	1,277	743	482	3,952	18,687
1984	1,603	1,315	785	538	4,242	19,317
1985	1,677	1,316	758	504	4,255	19,659
1986	1,823	1,314	738	494	4,369	20,278
1987	1,899	1,338	775	505	4,517	20,741
1988	1,978	1,358	878	518	4,732	21,280
1989	1,981	1,399	894	523	4,797	21,579
1990	2,077	1,508	928	514	5,026	21,689
1991	1,940	1,586	864	485	4,875	21,280
1992	1,971	1,659	849	497	4,977	21,939
1993	1,990	1,497	889	512	4,888	22,396
1994	2,070	1,449	955	546	5,021	22,997
1995	2,141	1,523	971	567	5,202	23,536
1996	2,206	1,460	984	580	5,229	24,042
1997	2,300	1,309	1,027	581	5,217	24,405
1998	2,371	1,295	901	585	5,153	24,839
1999	2,471	1,435	912	607	5,424	26,033
2000	2,549	1,720	911	605	5,785	26,515
<i>Average annual percentage change</i>						
1970–2000	2.3%	2.8%	-0.3%	0.3%	1.6%	1.8%
1990–2000	2.1%	1.3%	-0.2%	1.6%	1.4%	2.0%

Source:

See Appendix A for Nonhighway Energy Use.

^a These data have been revised slightly. See Appendix A for detailed methodologies.

^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 use of diesel for off-highway purposes has grown from 1985 to 2000, while the use of gasoline has declined for both agriculture and construction.

Table 2.8
Off-Highway Use of Gasoline and Diesel, 1985–2000
 (trillion btu)

Year	Agriculture		Construction		Total	
	Gasoline	Diesel ^a	Gasoline	Diesel ^a	Gasoline	Diesel ^a
1985	135	430	31	211	166	641
1986	121	463	34	230	155	693
1987	115	416	35	216	150	632
1988	101	439	34	232	135	671
1989	103	466	37	234	140	700
1990	85	472	40	251	125	723
1991	97	438	35	228	132	666
1992	101	485	34	244	135	729
1993	106	473	31	292	137	765
1994	113	454	33	299	146	753
1995	116	482	35	301	151	783
1996	115	498	35	312	150	810
1997	123	492	38	316	161	808
1998	113	473	29	344	142	817
1999	88	473	22	345	110	818
2000	82	479	24	359	106	838
	<i>Average annual percentage change</i>					
1985–2000	-3.3%	0.7%	-1.7%	3.6%	-2.9%	1.8%
1990–2000	-0.4%	0.1%	-5.0%	3.6%	-1.6%	1.5%

Source:

Gasoline: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2000*, Washington, DC, Table MF-24, and annual.

Diesel: U.S. Department of Energy, Energy Information Administration, *Fuel Oil and Kerosene Sales 2000*, Washington, DC, Table 1, and annual.

^a Unadjusted sales of distillate fuel oil.



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 2.9
Highway Usage of Gasoline and Special Fuels, 1973–2000
(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
2000	128.9	16.3	1.5	145.2	33.4	18.7%	178.6
<i>Average annual percentage change</i>							
1973–2000	d	d	d	1.4%	4.6%		1.8%
1990–2000	2.3%	8.1%	6.5%	1.5%	4.6%		3.1%

Source:

U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2000*, Washington, DC, 2001, 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.

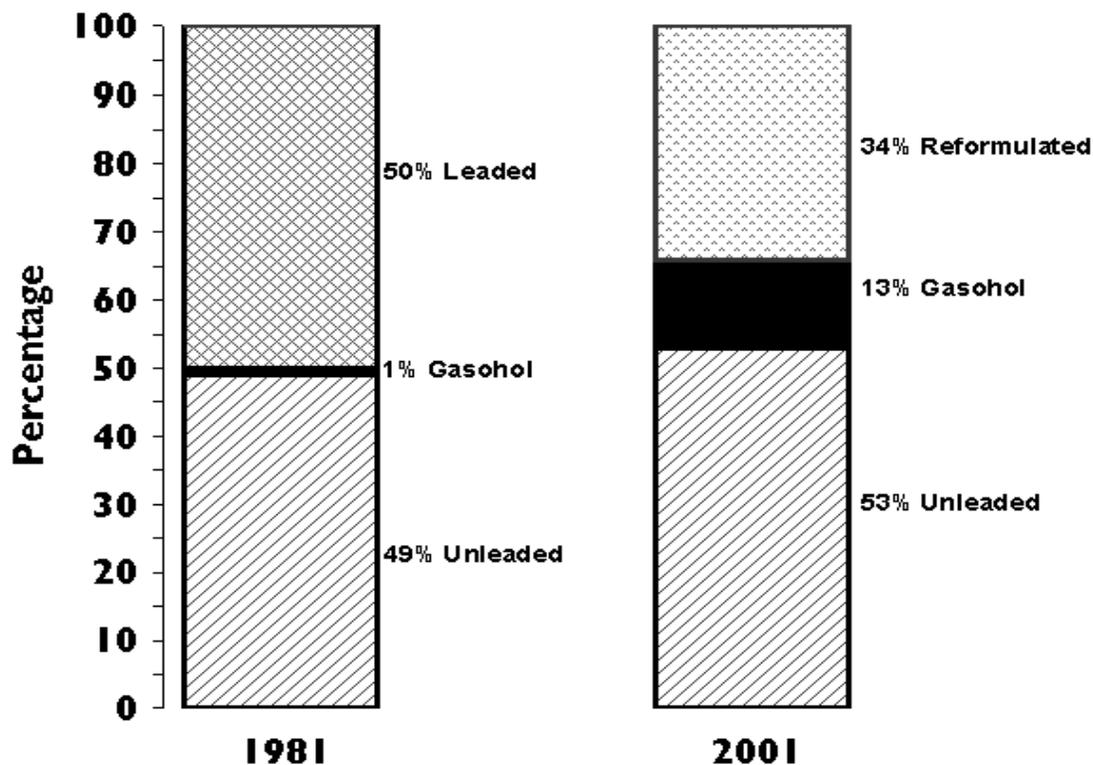
^c Data for gasoline and gasohol cannot be separated in this year.

^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 2001



Source:

U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual 2000*, Washington, DC, Tables 17 and 20, June 2002.

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 2000*, 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 2001.

Table 2.10
U.S. Production and Imports of MTBE^a and Fuel Ethanol, 1985–2001
(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
2001	1,765	3,257	13	1,146
	<i>Average annual percentage change</i>			
1985–2001	5.5%	17.2%	b	b
1990–2001	7.3%	b	b	b

Source:

Production - 1992–2000 Ethanol and MTBE: U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Monthly*, Washington, DC, January 2002, 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, 2001, Volume 1*, Washington, DC, June 2002, 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 2.11
Passenger Travel and Energy Use, 2000

	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	133,621.4	1,601,914	2,563,062	1.6	5,669	3,543	9,081.6
Personal trucks	60,827.7	667,892	1,068,627	1.6	7,033	4,396	4,697.5
Motorcycles	4,346.1	10,479	12,575	1.2	2,500	2,083	26.2
Buses	^a	^a	^a	^a	^a	^a	211.1
Transit	75.0	2,315	21,241	9.2	43,817	4,775	101.4
Intercity ^b	^a	^a	34,700	^a	^a	964	33.4
School ^b	606.0	^a	^a	^a	^a	^a	76.3
Air	^a	^a	529,629	^a	^a	3,904	2,067.5
Certificated route	^a	5,664	516,129	91.1	334,086	3,666	1,892.4
General aviation	217.5	^a	13,500	^a	^a	12,975	175.2
Recreational boats	12,782.1	^a	^a	^a	^a	^a	311.2
Rail	17.6	1,290	30,176	23.4	69,234	2,960	89.3
Intercity ^c	0.4	371	5,574	15.0	43,581	2,902	16.2
Transit ^d	12.2	648	15,200	23.5	72,841	3,105	47.2
Commuter	5.1	271	9,402	34.7	95,757	2,759	25.9

Source:

See Appendix A for Passenger Travel and Energy Use.

^a Data are not available.

^b 1999 energy use data. 2000 data are not available.

^c Amtrak only.

^d Light 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 2.12
Energy Intensities of Highway Passenger Modes, 1970–2000

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	9,250	4,868	12,479	31,796	2,472	1,674
1975	8,993	4,733	11,879	33,748	2,814	988
1976	9,113	4,796	11,523	34,598	2,896	1,007
1977	8,950	4,710	11,160	35,120	2,889	970
1978	8,839	4,693	10,807	36,603	2,883	976
1979	8,647	4,632	10,467	36,597	2,795	1,028
1980	7,916	4,279	10,224	36,553	2,813	1,082
1981	7,670	4,184	9,997	37,745	3,027	1,051
1982	7,465	4,109	9,268	38,766	3,237	1,172
1983	7,365	4,092	9,124	37,962	3,177	1,286
1984	7,202	4,066	8,931	38,705	3,307	954
1985	7,164	4,110	8,730	38,876	3,423	964
1986	7,194	4,197	8,560	37,889	3,545	870
1987	6,959	4,128	8,359	36,247	3,594	940
1988	6,683	4,033	8,119	36,673	3,706	963
1989	6,589	4,046	7,746	36,754	3,732	964
1990	6,169	3,856	7,746	37,374	3,794	962
1991	5,912	3,695	7,351	37,732	3,877	963
1992	5,956	3,723	7,239	40,243	4,310	964
1993	6,087	3,804	7,182	39,043	4,262	962
1994	6,024	3,765	7,212	40,147	4,609	964
1995	5,902	3,689	7,208	40,004	4,643	964
1996	5,874	3,671	7,247	40,200	4,675	963
1997	5,797	3,623	7,251	41,423	4,744	963
1998	5,767	3,604	7,261	43,880	4,688	963
1999	5,821	3,638	7,330	42,953	4,610	964
2000	5,669	3,543	7,140	43,817	4,775	^c
<i>Average annual percentage change</i>						
1970–2000	-1.6%	-1.1%	-1.8%	1.1%	2.2%	^c
1990–2000	-0.8%	-0.8%	-0.8%	1.6%	2.3%	^c

Source:

See Appendix A for Highway Passenger Mode Energy Intensities.

Note:

Automobile data series changed historically. See Appendix A for methodology details.

^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).

^c2000 data are not yet 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 2.13
Energy Intensities of Nonhighway Passenger Modes, 1970–2000

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)	Commuter rail (Btu per passenger-mile)
1970	10,282	10,374	^a	2,453	^a
1975	7,826	10,658	3,677	2,962	^a
1976	7,511	10,769	3,397	2,971	^a
1977	6,990	11,695	3,568	2,691	^a
1978	6,144	11,305	3,683	2,210	^a
1979	5,607	10,787	3,472	2,794	^a
1980	5,561	11,497	3,176	3,008	^a
1981	5,774	11,123	2,957	2,946	^a
1982	5,412	13,015	3,156	3,069	^a
1983	5,133	11,331	2,957	3,212	^a
1984	5,298	11,454	3,027	3,732	3,011
1985	5,053	11,707	2,800	3,461	3,053
1986	5,011	11,935	2,574	3,531	3,174
1987	4,827	11,496	2,537	3,534	3,043
1988	4,861	11,794	2,462	3,585	3,075
1989	4,844	10,229	2,731	3,397	3,120
1990	4,875	10,146	2,609	3,453	3,068
1991	4,662	9,869	2,503	3,710	3,011
1992	4,516	9,785	2,610	3,575	2,848
1993	4,490	9,653	2,646	3,687	3,222
1994	4,397	9,163	2,357	3,828	2,904
1995	4,349	9,870	2,590	3,818	2,849
1996	4,172	9,258	2,792	3,444	2,796
1997	4,166	9,688	2,918	3,253	2,946
1998	4,146	11,252	2,900	3,216	2,859
1999	4,061	12,748	3,062	3,168	2,929
2000	3,952	12,975	2,902	3,105	2,759
<i>Average annual percentage change</i>					
1970–2000	-3.1%	0.7%	-0.9% ^b	0.8%	-0.5% ^b
1990–2000	-2.0%	2.5%	1.1%	-1.1%	-1.1%

Source:

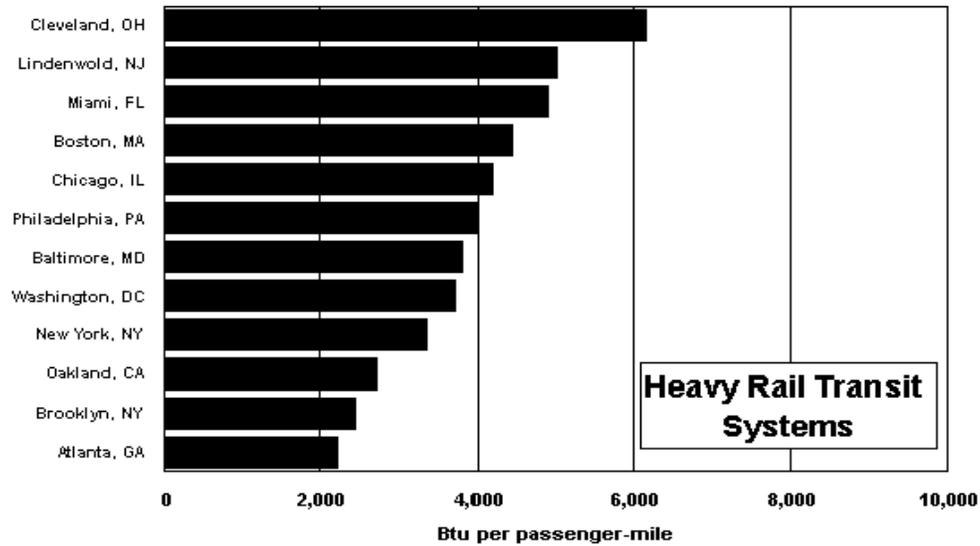
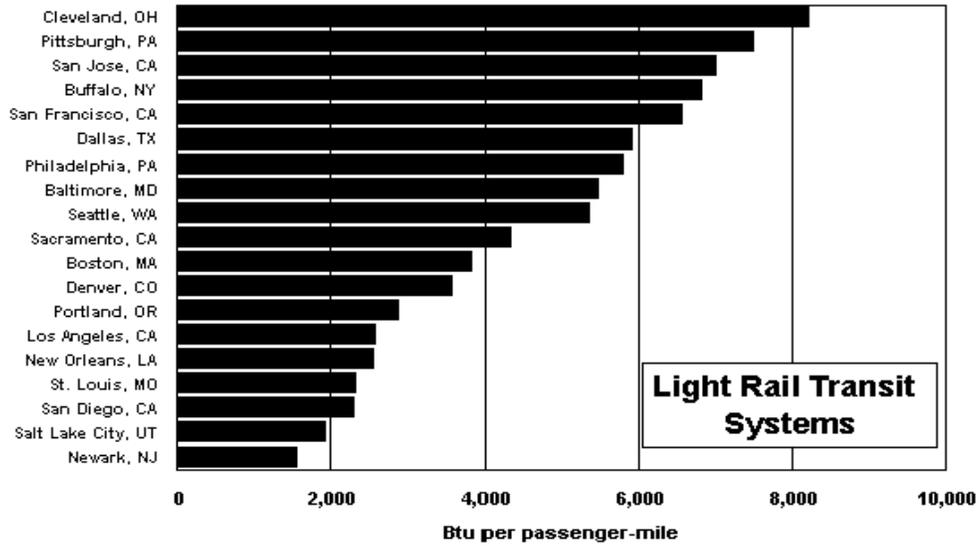
See Appendix A for Nonhighway Passenger Mode Energy Intensities.

^aData are not available.

^bAverage annual percentage change begins with the earliest year possible.



Figure 2.3. Energy Intensities for Transit Rail, 2000



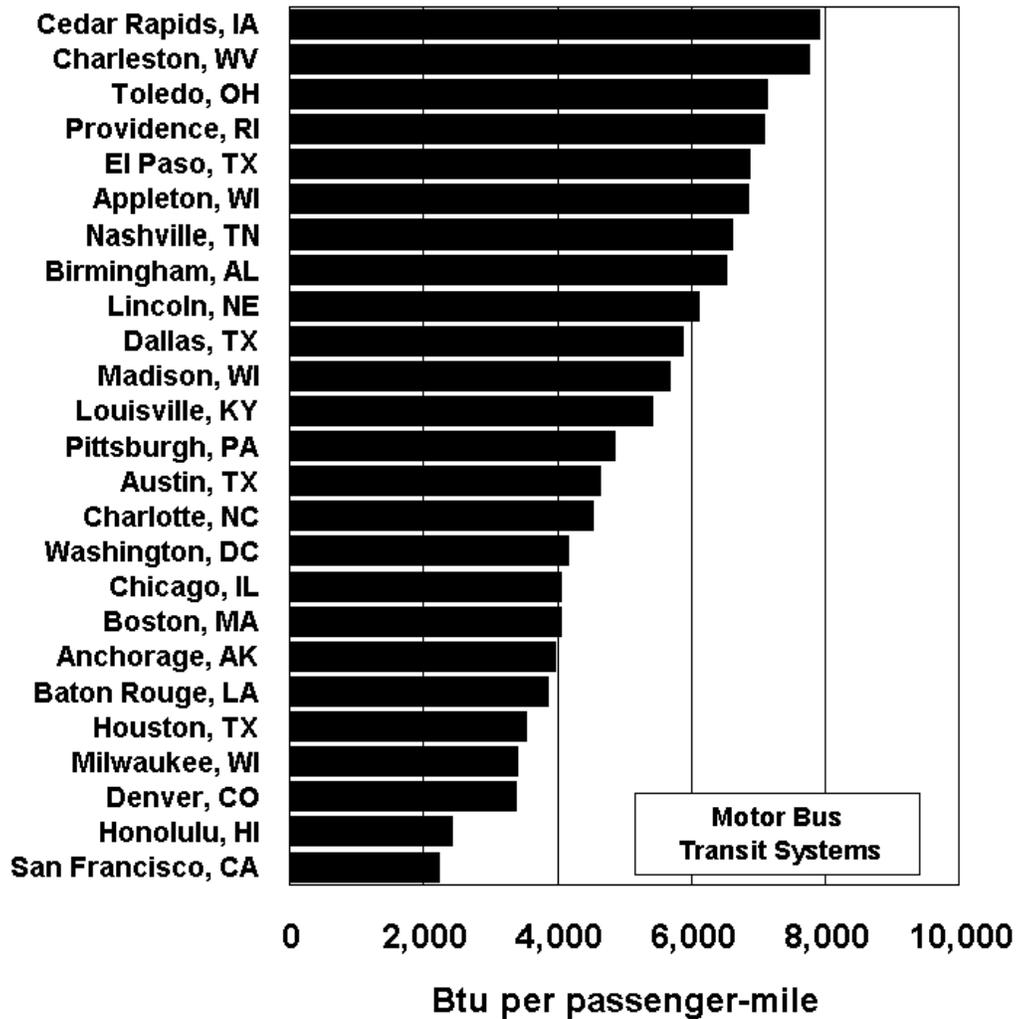
Source:

U.S. Department of Transportation, Federal Transit Administration, 2000 National Transit Databases, Washington, DC.

(Additional resources: www.fta.dot.gov/ntl)



Figure 2.4. Energy Intensities for Selected Transit Bus Systems, 2000

**Source:**

U.S. Department of Transportation, Federal Transit Administration, 2000 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 2.14
Inter-city Freight Movement and Energy Use in the United States, 2000

	Trucks	Waterborne commerce	Class I railroads
Number of vehicles (thousands)	2,643	41	20 ^a
Ton-miles (billions)	1,093	646	1,466
Tons shipped (millions)	4,089	1,064	1,738
Average length of haul (miles)	717 ^b	607	843
Energy intensity (Btu/ton-mile)	3,200	508	352
Energy use (trillion Btu)	3,498	328	516

Source:

See Appendix A for Freight Movement and Energy Use.

^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 2.15
Energy Intensities of Freight Modes, 1970–2000

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	24,960	17,669	691	545
1971	24,485	18,171	717	506
1972	24,668	18,291	714	522
1973	24,777	18,468	677	576
1974	24,784	18,852	681	483
1975	24,631	18,739	687	549
1976	24,566	18,938	680	468
1977	24,669	19,226	669	458
1978	24,655	18,928	641	383
1979	24,745	19,188	618	436
1980	24,757	18,742	597	358
1981	25,058	18,629	572	360
1982	24,296	18,404	553	310
1983	23,852	17,864	525	286
1984	23,585	17,795	510	346
1985	23,343	17,500	497	446
1986	23,352	17,265	486	463
1987	22,922	16,790	456	402
1988	22,596	16,758	443	361
1989	22,411	16,894	437	403
1990	22,795	16,619	420	387
1991	22,749	15,835	391	386
1992	22,608	16,043	393	398
1993	22,373	16,056	389	389
1994	22,193	16,340	388	369
1995	22,096	15,992	372	374
1996	22,109	15,747	368	412
1997	21,340	15,784	370	415
1998	21,514	15,372	365	435
1999	22,880	15,363	363	457
2000	23,388	14,917	352	508
		<i>Average annual percentage change</i>		
1970–2000	-0.2%	-0.6%	-2.2%	-0.2%
1990–2000	0.3%	-0.6%	-1.8%	2.8%

Source:

See Appendix A for Freight Mode Energy Intensities.

