

Chapter 2 Energy

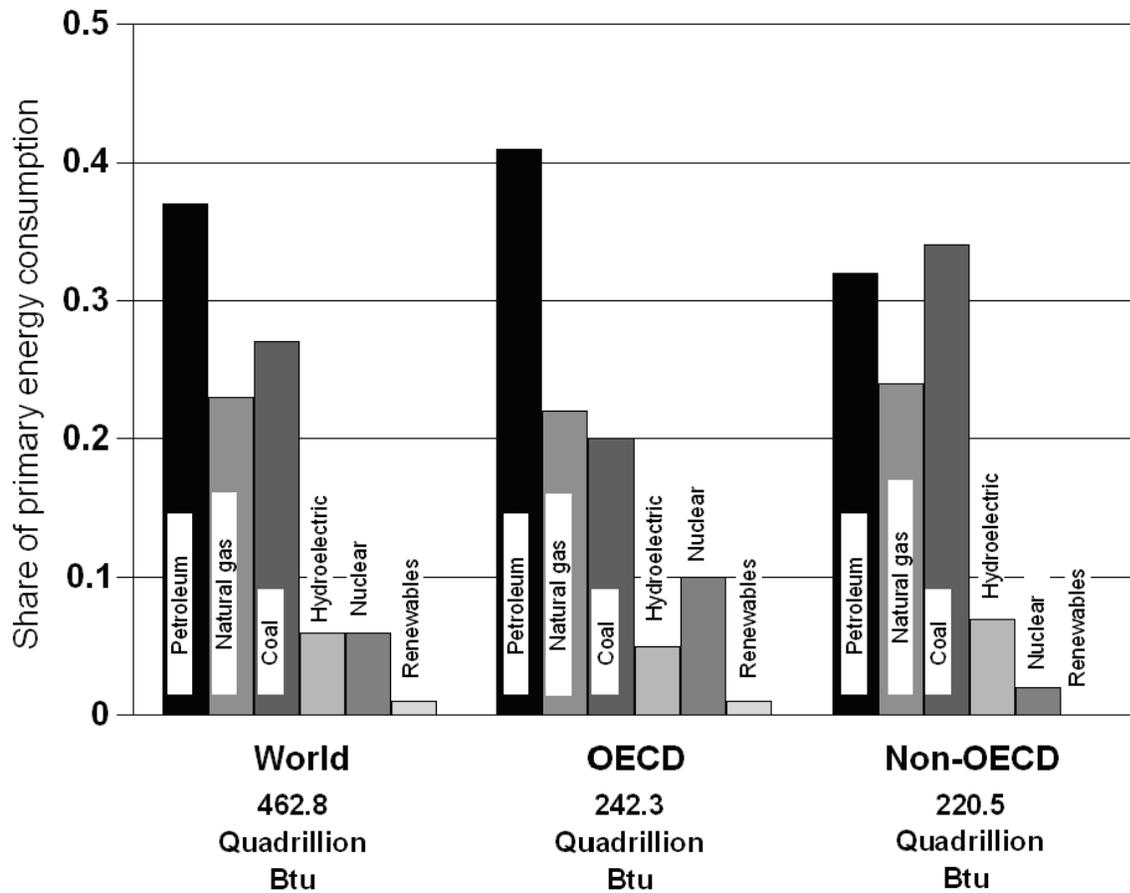
Summary Statistics from Tables in this Chapter

Source			
Table 2.1	Transportation share of U.S. energy consumption, 2007		28.5%
Table 2.2	Petroleum share of transportation energy consumption, 2007		95.1%
Table 2.3	Alternative fuel and oxygenate consumption, 2005		
		(thousand gasoline equivalent gallons)	(share)
	<i>MTBE</i>	1,654,500	33.6%
	<i>Ethanol in gasohol</i>	2,756,663	56.0%
	<i>Liquified petroleum gas</i>	188,171	3.8%
	<i>Compressed natural gas</i>	166,878	3.4%
	<i>E85/E95</i>	38,074	0.8%
	<i>Liquified natural gas</i>	22,409	0.5%
	<i>Electricity</i>	5,219	0.1%
	<i>M85/M100</i>	0	0.0%
Table 2.5	Transportation energy use by mode, 2005	(trillion Btu)	(share)
	<i>Cars</i>	9,278	33.5%
	<i>Light trucks</i>	7,518	27.2%
	<i>Medium/heavy trucks</i>	5,188	18.7%
	<i>Buses</i>	196	0.7%
	<i>Total Highway</i>	22,180	80.1%
	<i>Air</i>	2,496	9.0%
	<i>Water</i>	1,455	5.3%
	<i>Pipeline</i>	842	3.0%
	<i>Rail</i>	670	2.4%
	<i>Buses</i>	196	0.7%



Petroleum accounted for nearly 40% of the world's energy use in 2005. 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 hydro-electric power more than OECD countries do.

Figure 2.1. World Consumption of Primary Energy, 2005



Source:

U.S. Department of Energy, Energy Information Administration, *International Energy Annual 2005*, Washington, DC, 2008, Table 1.8. (Additional resources: www.eia.doe.gov)



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 101.5 quads in 2007 with transportation using 28.5%.

Table 2.1
U. S. Consumption of Total Energy by End-Use Sector, 1973–2007
(quadrillion Btu)

Year	Transportation	Percentage transportation of total	Industrial	Commercial	Residential	Total
1973	18.6	24.6%	32.7	9.5	14.9	75.7
1974	18.1	24.5%	31.8	9.4	14.7	74.0
1975	18.2	25.3%	29.4	9.5	14.8	72.0
1976	19.1	25.1%	31.4	10.0	15.4	76.0
1977	19.8	25.4%	32.3	10.2	15.7	78.0
1978	20.6	25.8%	32.7	10.5	16.2	80.0
1979	20.5	25.3%	34.0	10.6	15.8	80.9
1980	19.7	25.2%	32.2	10.6	15.8	78.1
1981	19.5	25.6%	30.8	10.6	15.4	76.3
1982	19.1	26.1%	27.7	10.9	15.6	73.3
1983	19.2	26.2%	27.5	11.0	15.5	73.1
1984	19.9	25.9%	29.6	11.5	15.8	76.7
1985	20.1	26.3%	28.9	11.4	16.1	76.5
1986	20.9	27.2%	28.4	11.6	15.9	76.8
1987	21.5	27.2%	29.5	12.0	16.2	79.2
1988	21.4	25.8%	30.8	12.6	17.1	82.8
1989	22.6	26.6%	31.4	13.2	17.8	85.0
1990	22.4	26.5%	31.9	13.3	17.0	84.7
1991	22.2	26.2%	31.5	13.5	17.1	84.6
1992	22.5	26.2%	32.7	13.4	17.4	86.0
1993	22.9	26.1%	36.7	13.8	18.3	87.6
1994	23.5	26.3%	33.6	14.1	18.1	89.3
1995	23.8	26.2%	34.0	14.7	18.6	91.2
1996	24.4	25.9%	35.0	15.2	19.6	94.2
1997	24.8	26.2%	35.3	15.7	19.0	94.8
1998	25.3	26.8%	34.9	16.0	19.0	95.2
1999	26.0	26.8%	34.9	16.4	19.6	96.8
2000	26.6	26.9%	34.8	17.2	20.5	99.0
2001	26.3	27.3%	32.8	17.1	20.1	96.3
2002	26.8	27.4%	32.8	17.4	20.9	97.9
2003	27.0	27.5%	32.7	17.4	21.2	98.2
2004	27.9	27.8%	33.6	17.6	21.2	100.4
2005	28.4	28.2%	32.6	17.9	21.7	100.5
2006	28.8	28.8%	32.5	17.7	20.8	99.8
2007	29.0	28.5%	32.4	18.4	21.7	101.5
<i>Average annual percentage change</i>						
1973–2007	1.3%		0.0%	2.0%	1.1%	0.9%
1997–2007	1.6%		-0.9%	1.6%	1.3%	0.7%

Source:

U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, March 2008, Washington, DC, Table 2.1. (Additional resources: www.eia.doe.gov)

^a Electrical 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 (10% ethanol or less) are now counted under “renewables” and have been taken out of petroleum. The petroleum category, however, still contains other blending agents, such as MTBE, 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 2007
 (percentage)

Energy source	Transportation		Residential		Commercial		Industrial		Electric utilities	
	1973	2007	1973	2007	1973	2007	1973	2007	1973	2007
Petroleum ^a	95.8	95.1	18.9	5.9	16.5	3.4	27.9	29.8	17.8	1.6
Natural gas ^b	4.0	2.3	33.3	22.3	27.9	16.7	31.8	24.6	19.0	17.4
Coal	0.0	0.0	0.6	0.0	1.7	0.4	12.4	5.7	43.9	51.4
Renewable	0.0	2.2	2.4	2.2	0.1	0.6	3.7	6.2	14.6	8.6
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	20.7
Electricity ^c	0.2	0.3	44.7	69.5	53.9	78.9	24.2	33.6	0.0	0.3
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 2008*, Washington, DC, Tables 2.2, 2.3, 2.4, 2.5, and 2.6. (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.



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. The latest available data are for 2005.

Table 2.3
Alternative Fuel and Oxygenate Consumption, 2003–2005
(thousand gasoline-equivalent gallons)

	2003	2004	2005	2005 Percentage
Alternative fuel				
Liquified petroleum gas	224,697	211,883	188,171	3.8%
Compressed natural gas	133,222	158,903	166,878	3.4%
Liquified natural gas	13,503	20,888	22,409	0.5%
E85 ^a	26,376	31,581	38,074	0.8%
Electricity ^b	5,141	5,269	5,219	0.1%
Hydrogen	2	8	25	0.0%
Biodiesel	17,510	27,143	88,075	1.8%
Subtotal	420,451	455,675	508,851	10.3%
Oxygenates				
MTBE ^c	2,368,400	1,877,300	1,654,500	33.6%
Ethanol in gasohol	1,919,572	2,414,167	2,756,663	56.0%
Total	4,708,423	4,747,142	4,920,014	100.0%

Source:

U.S. Department of Energy, Energy Information Administration, *Alternatives to Traditional Transportation Fuels, 2005*, Washington, DC, November 2007, web site www.eia.doe.gov/cneaf/alternate/page/atftables/afvtransfuel_II.html, Table 10. (Additional resources: www.eia.doe.gov)

^a Consumption includes gasoline portion of the mixture.

^b Vehicle consumption only; does not include power plant inputs.

^c Methyl 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).



Ethanol is used as an oxygenate, blended with gasoline to be used as gasohol in conventional vehicles. The amount of ethanol used in gasohol dwarfs the amount used in E85. Production of E95 ended in 2000. Note that the Energy Information Administration has not updated these data since 2005.

Table 2.4
Ethanol Consumption, 1995–2005
(thousand gallons)

Ethanol blends	1995	2000	2001	2002	2003	2004	2005	2005 Percentage
E85	166	10,530	12,756	15,513	22,420	26,844	32,363	1.2%
E95	970	12	0	0	0	0	0	0.0%
Ethanol in gasohol	934,615	1,114,313	1,173,323	1,450,721	1,919,572	2,414,167	2,756,663	98.8%
Total	935,751	1,124,855	1,186,079	1,466,234	1,941,992	2,441,011	2,789,026	100.0%

Source:

U.S. Department of Energy, Energy Information Administration, *Alternatives to Traditional Transportation Fuels, 2005*, Washington, DC, November 2007, web site:
http://www.eia.doe.gov/cneaf/alternate/page/atftables/afvtransfuel_II.html, Table C1. (Additional resources: www.eia.doe.gov)

Note: Gallons of E85, E95 and Ethanol in gasohol, do not include the gasoline portion of the blended fuel..



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 2.5
Domestic Consumption of Transportation Energy by Mode and Fuel Type, 2006^a
(trillion Btu)

	Gasoline	Diesel fuel	Liquified petroleum gas	Jet fuel	Residual fuel oil	Natural gas	Electricity	Total
HIGHWAY	16,919.1	5,210.3	61.5			15.3	0.8	22,207.0
Light vehicles	16,390.9	388.6	44.1			0.0	0.0	16,823.6
Cars	9,225.7	52.0						9,277.7
Light trucks ^b	7,137.6	336.6	44.1					7,518.3
Motorcycles	27.6							27.6
Buses	6.8	172.5	0.2			15.3	0.8	195.6
Transit	0.2	76.3	0.2			15.3	0.8	93.2
Intercity		29.8						29.8
School	6.6	66.4						73.0
Medium/heavy trucks	521.4	4,649.2	17.2					5,187.8
NONHIGHWAY	241.0	953.3	0.0	2,460.8	900.1	602.6	305.3	5,463.1
Air	35.4	0.0	0.0	2,460.8	0.0	0.0	0.0	2,496.2
General aviation	35.4			220.9				256.3
Domestic air carriers				1,833.6				1,833.6
International air carriers ^c				406.3				406.3
Water	205.6	349.5			900.1			1,455.2
Freight		305.7			900.1			1,205.8
Recreational	205.6	43.8						249.4
Pipeline	0.0	0.0	0.0	0.0	0.0	602.6	239.5	842.1
Rail	0.0	603.8	0.0	0.0	0.0	0.0	65.8	669.6
Freight (Class I)		584.5						584.5
Passenger		19.3					65.8	85.1
Transit		0.0					44.9	44.9
Commuter		10.6					15.3	26.0
Intercity		8.7					5.6	14.3
TOTAL HWY & NONHWY	17,160.1	6,163.6	61.5	2,460.8	900.1	617.9	306.1	27,670.1

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 Two-axle, four-tire trucks.

^c One half of fuel used by domestic carriers in international operation.



Highway vehicles were responsible for over 80% of all transportation energy use in 2006.

Table 2.6
Transportation Energy Use by Mode, 2005–2006^a

	Trillion Btu		Percentage of total based on Btus	
	2005	2006	2005	2006
<u>HIGHWAY</u>	22,177.5	22,207.0	80.6%	80.3%
Light vehicles	16,898.6	16,823.6	61.4%	60.8%
Cars	9,578.7	9,277.7	34.8%	33.5%
Light trucks ^b	7,296.2	7,518.3	26.5%	27.2%
Motorcycles	23.7	27.6	0.1%	0.1%
Buses	190.7	195.6	0.7%	0.7%
Transit	93.2	93.2	0.3%	0.3%
Intercity	28.3	29.8	0.1%	0.1%
School	69.4	73.0	0.3%	0.3%
Medium/heavy trucks	5,088.2	5,187.8	18.5%	18.7%
<u>NONHIGHWAY</u>	5,344.4	5,463.1	19.4%	19.7%
Air	2,476.6	2,496.2	9.0%	9.0%
General aviation	242.4	256.3	0.9%	0.9%
Domestic air carriers	1,861.5	1,833.6	6.8%	6.6%
International air	372.7	406.3	1.4%	1.5%
Water	1,369.4	1,455.2	5.0%	5.3%
Freight	1,121.8	1,205.8	4.1%	4.4%
Recreational	247.6	249.4	0.9%	0.9%
Pipeline	841.6	842.1	3.1%	3.0%
Rail	656.8	669.6	2.4%	2.4%
Freight (Class I)	571.4	584.5	2.1%	2.1%
Passenger	85.4	85.1	0.3%	0.3%
Transit	44.9	44.9	0.2%	0.2%
Commuter	25.9	26.0	0.1%	0.1%
Intercity	14.6	14.3	0.1%	0.1%
HWY & NONHWY TOTAL	27,521.9	27,670.1	100.0%	100.0%

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 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 pickups, minivans, sport-utility vehicles, and vans.

Table 2.7
Highway Transportation Energy Consumption by Mode, 1970–2006
(trillion Btu)

Year	Autos	Light trucks	Light vehicles subtotal	Motor-cycles	Buses	Heavy trucks	Highway subtotal	Total transportation ^a
1970	8,479	1,539	10,018	7	129	1,553	11,707	15,399
1975	9,298	2,384	11,682	14	124	2,003	13,823	17,414
1976	9,826	2,602	12,428	15	134	2,114	14,691	18,481
1977	9,928	2,797	12,725	16	137	2,344	15,222	19,116
1978	10,134	3,020	13,154	18	141	2,607	15,920	20,086
1979	9,629	3,055	12,684	22	144	2,697	15,547	20,088
1980	8,800	2,975	11,775	26	143	2,686	14,630	18,930
1981	8,693	2,963	11,656	27	145	2,724	14,552	19,066
1982	8,673	2,837	11,510	25	151	2,707	14,393	18,503
1983	8,802	2,989	11,791	22	152	2,770	14,735	18,621
1984	8,837	3,197	12,034	22	146	2,873	15,075	19,260
1985	8,932	3,413	12,345	23	154	2,883	15,405	19,595
1986	9,138	3,629	12,767	23	160	2,958	15,908	20,207
1987	9,157	3,819	12,976	24	164	3,061	16,225	20,670
1988	9,158	4,077	13,235	25	169	3,118	16,547	21,200
1989	9,232	4,156	13,388	26	169	3,199	16,782	21,492
1990	8,688	4,451	13,139	24	167	3,334	16,664	21,601
1991	8,029	4,774	12,803	23	177	3,402	16,405	21,193
1992	8,169	5,117	13,286	24	184	3,468	16,962	21,854
1993	8,368	5,356	13,724	25	183	3,577	17,509	22,308
1994	8,470	5,515	13,985	26	183	3,778	17,972	22,928
1995	8,489	5,695	14,184	25	184	3,937	18,330	23,467
1996	8,634	5,917	14,551	24	186	4,045	18,806	23,975
1997	8,710	6,168	14,878	25	192	4,086	19,181	24,329
1998	8,936	6,303	15,239	26	196	4,218	19,679	24,758
1999	9,134	6,602	15,736	26	202	4,638	20,602	25,948
2000	9,100	6,607	15,707	26	208	4,819	20,760	26,268
2001	9,161	6,678	15,839	24	196	4,813	20,872	25,959
2002	9,391	6,682	16,273	24	191	5,035	21,523	26,520
2003	9,255	7,551	16,806	24	189	4,895	21,914	26,673
2004	9,331	7,861	17,192	25	193	4,535	21,945	27,066
2005	9,579	7,296	16,875	24	196	5,088	22,183	27,527
2006	9,278	7,518	16,796	28	196	5,188	22,208	27,671
<i>Average annual percentage change</i>								
1970–2006	0.3%	4.5%	1.4%	3.9%	1.2%	3.4%	1.8%	1.6%
1996–2006	0.7%	2.4%	1.4%	1.6%	0.5%	2.5%	1.7%	1.4%

Source:

See Appendix A for Highway Energy Use.

^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). These data have been revised due to a new data series for recreational boats.



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

Table 2.8
Nonhighway Transportation Energy Consumption by Mode, 1970–2006^a
(trillion Btu)

Year	Air	Water	Pipeline	Rail	Nonhighway subtotal	Total transportation ^b
1970	1,307	840	990	555	3,692	15,399
1975	1,274	931	840	546	3,591	17,414
1976	1,333	1,087	803	567	3,790	18,481
1977	1,350	1,181	786	577	3,894	19,116
1978	1,423	1,386	784	573	4,166	20,086
1979	1,488	1,603	860	590	4,541	20,088
1980	1,434	1,396	896	574	4,300	18,930
1981	1,453	1,608	904	548	4,514	19,066
1982	1,445	1,342	855	469	4,110	18,503
1983	1,440	1,240	740	465	3,886	18,621
1984	1,609	1,275	782	519	4,185	19,260
1985	1,677	1,273	755	485	4,190	19,595
1986	1,823	1,266	735	475	4,299	20,207
1987	1,899	1,290	772	485	4,445	20,670
1988	1,978	1,304	874	497	4,653	21,200
1989	1,981	1,338	890	500	4,710	21,492
1990	2,077	1,445	923	491	4,937	21,601
1991	1,939	1,526	860	463	4,788	21,193
1992	1,970	1,602	846	474	4,892	21,854
1993	1,986	1,440	885	489	4,799	22,308
1994	2,070	1,396	951	539	4,956	22,928
1995	2,141	1,470	967	559	5,137	23,467
1996	2,206	1,412	979	572	5,169	23,975
1997	2,300	1,252	1,022	573	5,148	24,329
1998	2,371	1,233	897	578	5,079	24,758
1999	2,471	1,369	908	599	5,346	25,948
2000	2,549	1,455	904	599	5,508	26,268
2001	2,411	1,188	886	602	5,087	25,959
2002	2,213	1,249	931	605	4,997	26,520
2003	2,217	1,075	850	617	4,759	26,673
2004	2,348	1,300	822	650	5,121	27,066
2005	2,477	1,369	842	657	5,344	27,527
2006	2,496	1,455	842	670	5,463	27,671
<i>Average annual percentage change</i>						
1970–2006	1.8%	1.5%	-0.4%	0.5%	1.1%	1.6%
1996–2006	1.2%	0.3%	-1.5%	1.6%	0.6%	1.4%

Source:

See Appendix A for Nonhighway Energy Use.

^a These data have been revised slightly due to a new data series for recreational boats. 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).



A recent study on off-highway fuel consumption uses the Environmental Protection Agency's NONROAD2002 model and the Census Bureau's 1997 Vehicle Inventory and Use Survey to estimate fuel use.

Table 2.9
Off-highway Transportation-related Fuel Consumption, 1997 and 2001
(million gallons)

Sector	1997				2001			
	Gasoline	Diesel	Other	Total	Gasoline	Diesel	Other	Total
Agriculture	319	2,994	5	3,318	338	3,352	4	3,694
Industrial and commercial	1,761	1,579	1,854	5,193	1,733	1,794	2,108	5,636
Construction	289	4,766	18	5,073	274	5,347	19	5,639
Personal and recreational	3,425	37	7	3,469	3,524	42	7	3,573
Other	2	48	2	52	2	61	2	65
Total	5,797	9,424	1,885	17,106	5,870	10,596	2,141	18,607

Examples of off-highway transportation-related vehicles and equipment

Agriculture	Tractors, mowers, combines, balers, and other farm equipment which has utility in its movement.
Industrial and commercial	Forklifts, commercial mowers, forestry equipment, shredders, terminal tractors
Construction	Pavers, rollers, drill rigs, graders, backhoes, excavators, cranes, mining equipment
Personal and recreational	Lawn mowers, tillers, tractors, motorcycles, snowmobiles, golf carts
Other	Airport ground equipment

Source:

Davis, S.C. and L.F. Truett, Off-Highway Transportation-Related Fuel Use, ORNL/TM-2002/92, Oak Ridge National Laboratory, Oak Ridge, TN, April 2004. (Additional resources: www-cta.ornl.gov/Publications/Publications_2004.html)



Mowing equipment consumes nearly half of all the fuel used by lawn and garden equipment. The fuel used in lawn and garden equipment is less than 2% of what is used on the highways.

Table 2.10
Fuel Consumption from Lawn and Garden Equipment, 2006
(million gallons)

Equipment	Classification	Gasoline	Diesel	LPG	Total fuel consumption
Mowing Equipment					
Front mowers	Commercial	19.56	96.21	0.00	115.77
Lawn & garden tractors	Commercial	219.10	19.86	0.00	238.96
Lawn & garden tractors	Residential	528.94	0.00	0.00	528.94
Lawn mowers	Commercial	149.67	0.00	0.00	149.67
Lawn mowers	Residential	199.59	0.00	0.00	199.59
Rear engine riding mowers	Commercial	16.09	0.00	0.00	16.09
Rear engine riding mowers	Residential	39.18	0.00	0.00	39.18
Total		1,172.13	116.07	0.00	1,288.20
Soil and Turf Equipment					
Commercial turf equipment ^a	Commercial	703.39	15.44	0.00	718.83
Rotary tillers < 6 HP	Commercial	83.19	0.00	0.00	83.19
Rotary tillers < 6 HP	Residential	18.42	0.00	0.00	18.42
Total		805.00	15.44	0.00	820.44
Wood Cutting Equipment					
Chain saws < 6 HP	Commercial	76.93	0.00	0.00	76.93
Chain saws < 6 HP	Residential	18.89	0.00	0.00	18.89
Chippers/stump grinders	Commercial	38.08	130.92	19.52	188.52
Shredders < 6 HP	Commercial	8.85	0.00	0.00	8.85
Total		142.75	130.92	19.52	293.19
Blowers and Vacuums					
Leafblowers/vacuums	Commercial	201.44	0.00	0.00	201.44
Leafblowers/vacuums	Residential	16.87	0.00	0.00	16.87
Snowblowers	Commercial	30.67	1.62	0.00	32.29
Snowblowers	Residential	16.24	0.00	0.00	16.24
Total		265.22	1.62	0.00	266.84
Trimming Equipment					
Trimmers/edgers/brush cutter	Commercial	62.33	0.00	0.00	62.33
Trimmers/edgers/brush cutter	Residential	27.30	0.00	0.00	27.30
Other lawn & garden equipment ^b	Commercial	22.95	0.36	0.00	23.31
Other lawn & garden equipment ^b	Residential	19.17	0.00	0.00	19.17
Total		131.75	0.36	0.00	132.11
Total All Equipment		2,516.85	264.41	19.52	2,800.78

Source:

U.S. Environmental Protection Agency, NONROAD2005 Model, www.epa.gov/otaq/nonrdmdl.htm.

^a Includes equipment such as aerators, dethatchers, sod cutters, hydro-seeders, turf utility vehicles, golf course greens mowers, and sand trap groomers.

^b Includes equipment not otherwise classified such as augers, sickle-bar mowers, and wood splitters.



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 2.11
Highway Usage of Gasoline and Special Fuels, 1973–2006
(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	112.6	16.3	1.5	128.9	33.4	20.6%	162.3
2001	112.3	17.4	1.5	129.7	33.4	20.5%	163.1
2002	112.0	21.0	2.1	133.0	34.8	20.7%	167.8
2003	101.5	32.5	2.7	134.1	35.5	20.9%	169.6
2004	92.4	44.0	3.7	136.5	37.4	21.5%	173.9
2005	d	d	d	135.2	39.1	22.4%	174.3
2006	d	d	d	134.8	40.1	22.9%	174.9
<i>Average annual percentage change</i>							
1973–2006	d	d	d	0.9%	4.4%		1.4%
1996–2006	d	d	d	1.2%	4.0%		1.8%

Source:

U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2006*, Washington, DC, 2007, Table MF-21 and annual. (Additional resources: www.fhwa.dot.gov)

^a Estimated for 1980–92 and 2002 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 Gasohol data is no longer published by the Federal Highway Administration.



Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences among 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
Passenger Travel and Energy Use, 2006

	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)	
Cars	135,399.9	1,682,671	2,641,793	1.57	5,514	3,512	9,277.7
Personal trucks^a	87,223.1	910,229	1,565,595	1.72	6,785	3,944	6,175.5
Motorcycles	6,686.1	12,401	14,881	1.2	2,226	1,855	27.6
Demand response^b	42.0	978	930	1.0	13,595	14,301	13.3
Vanpool	6.6	99	605	6.1	8,048	1,322	0.8
Buses	^c	^c	^c	^c	^c	^c	196.0
Transit	83.0	2,498	21,998	8.8	37,310	4,235	93.2
Intercity ^d	^e	^e	^e	^e	^e	^e	29.8
School ^d	669.2	^e	^e	^e	^e	^e	73.0
Air	^e	^e	^e	^e	^e	^e	2,139.9
Certificated route ^e	^c	6,003	577,620	96.2	313,776	3,261	1,883.6
General aviation	221.9	^e	^e	^e	^e	^e	256.3
Recreational boats	13,080.0	^e	^e	^e	^e	^e	247.7
Rail	19.5	1,282	31,000	24.2	68,097	2,816	87.3
Intercity (Amtrak)	0.3	264	5,410	20.5	54,167	2,650	14.3
Transit (light & heavy)	12.8	715	16,117	22.5	62,797	2,784	44.9
Commuter	6.4	303	9,473	31.3	92,739	2,996	28.1

Source:

See Appendix A for Passenger Travel and Energy Use.

^a Changed significantly due to newly available data from the 2002 Vehicle Inventory and Use Survey. See Appendix A for details.

^b Includes passenger cars, vans, and small buses operating in response to calls from passengers to the transit operator who dispatches the vehicles.

^c Data are not available.

^d Energy use is estimated.

^e Only domestic service and domestic energy use are shown on this table. (Previous editions included half of international energy.) These energy intensities may be inflated because all energy use is attributed to passengers—cargo energy use is not taken into account.



Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences among 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 2.13
Energy Intensities of Highway Passenger Modes, 1970–2006

Year	Cars		Light truck ^a (Btu per vehicle- mile)	Buses	
	(Btu per vehicle- mile)	(Btu per passenger- mile)		Transit ^b	
				(Btu per vehicle- mile)	(Btu per passenger-mile)
1970	9,250	4,868	12,479	31,796	2,472
1975	8,993	4,733	11,879	33,748	2,814
1976	9,113	4,796	11,523	34,598	2,896
1977	8,950	4,710	11,160	35,120	2,889
1978	8,839	4,693	10,807	36,603	2,883
1979	8,647	4,632	10,467	36,597	2,795
1980	7,916	4,279	10,224	36,553	2,813
1981	7,670	4,184	9,997	37,745	3,027
1982	7,465	4,109	9,268	38,766	3,237
1983	7,365	4,092	9,124	37,962	3,177
1984	7,202	4,066	8,931	38,705	3,307
1985	7,164	4,110	8,730	38,876	3,423
1986	7,194	4,197	8,560	37,889	3,545
1987	6,959	4,128	8,359	36,247	3,594
1988	6,683	4,033	8,119	36,673	3,706
1989	6,589	4,046	7,746	36,754	3,732
1990	6,169	3,856	7,746	37,374	3,794
1991	5,912	3,695	7,351	37,732	3,877
1992	5,956	3,723	7,239	40,243	4,310
1993	6,087	3,804	7,182	39,043	4,262
1994	6,024	3,765	7,212	37,313	4,268
1995	5,902	3,689	7,208	37,277	4,310
1996	5,874	3,683	7,247	37,450	4,340
1997	5,797	3,646	7,251	38,832	4,431
1998	5,767	3,638	7,260	41,182	4,387
1999	5,821	3,684	7,327	40,460	4,332
2000	5,687	3,611	7,158	41,548	4,515
2001	5,626	3,583	7,080	38,341	4,125
2002	5,662	3,607	7,124	37,301	4,106
2003	5,535	3,525	7,673	36,628	4,160
2004	5,489	3,496	7,653	37,498	4,323
2005	5,607	3,571	7,009	37,298	4,235
2006	5,514	3,512	6,904	37,298	4,235
<i>Average annual percentage change</i>					
1970–2006	-1.4%	-0.9%	-1.6%	0.4%	1.5%
1996–2006	-0.6%	-0.5%	-0.5%	0.0%	-0.2%

Source:

See Appendix A for Highway Passenger Mode Energy Intensities.

^a All two-axle, four-tire trucks.

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

^c 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.

Table 2.14
Energy Intensities of Nonhighway Passenger Modes, 1970–2006

Year	Air	Rail		
	Certificated air carriers ^a (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	^b	2,157	^b
1975	7,826	3,548	2,625	^b
1976	7,511	3,278	2,633	^b
1977	6,990	3,443	2,364	^b
1978	6,144	3,554	2,144	^b
1979	5,607	3,351	2,290	^b
1980	5,561	3,065	2,312	^b
1981	5,774	2,883	2,592	^b
1982	5,412	3,052	2,699	^b
1983	5,133	2,875	2,820	^b
1984	5,298	2,923	3,037	2,804
1985	5,053	2,703	2,809	2,826
1986	5,011	2,481	3,042	2,926
1987	4,827	2,450	3,039	2,801
1988	4,861	2,379	3,072	2,872
1989	4,844	2,614	2,909	2,864
1990	4,875	2,505	3,024	2,822
1991	4,662	2,417	3,254	2,770
1992	4,516	2,534	3,155	2,629
1993	4,490	2,565	3,373	2,976
1994	4,397	2,282	3,338	2,682
1995	4,349	2,501	3,340	2,632
1996	4,172	2,690	3,016	2,582
1997	4,166	2,811	2,854	2,724
1998	4,146	2,788	2,822	2,646
1999	4,061	2,943	2,786	2,714
2000	3,952	3,253	2,729	2,551
2001	3,968	3,257	2,737	2,515
2002	3,703	3,212	2,872	2,514
2003	3,587	2,800	2,837	2,545
2004	3,339	2,760	2,750	2,569
2005	3,264	2,709	2,784	2,743
2006	3,228	2,650	2,784	2,743
		<i>Average annual percentage change</i>		
1970–2006	-3.2%	-0.8%	0.7%	^b
1996–2006	-2.5%	-0.1%	-0.8%	0.6%

Source:

See Appendix A for Nonhighway Passenger Mode Energy Intensities.

^a These data differ from the data on Table 2.12 because they do not include any international services. These energy intensities may be inflated because all energy use is attributed to passengers—cargo energy use is not taken into account.

^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.

Table 2.15
Intercity Freight Movement and Energy Use in the United States, 2005 and 2006

	Waterborne commerce		Class I railroads	
	2005	2006 ^a	2005	2006
Number of vehicles (thousands)	41	^a	23 ^b	24
Ton-miles (billions)	591	^a	1,696	1,772
Tons shipped (millions)	1,029	^a	1,899	1,957
Average length of haul (miles)	575	^a	894	906
Energy intensity (Btu/ton-mile)	514	^a	337	330
Energy use (trillion Btu)	304	^a	571	585

Source:

See Appendix A for Freight Movement and Energy Use.

^a Not available.

^b Number of locomotives.



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 2.16
Energy Intensities of Freight Modes, 1970–2006

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	414
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	21,516	15,372	365	435
1999	22,884	15,363	363	457
2000	23,448	14,917	352	473
2001	23,023	15,108	346	460
2002	23,461	15,003	345	470
2003	22,461	15,016	344	417
2004	20,540	15,274	341	510
2005	22,866	15,152	337	514
2006	23,260	14,990	330	^a
		<i>Average annual percentage change</i>		
1970–2006	-0.2%	-0.5%	-2.0%	^a
1996–2006	0.5%	-0.5%	-1.1%	^a

Source:

See Appendix A for Freight Mode Energy Intensities.

^a Data are not available.

