

APPENDIX A

SOURCES & METHODOLOGIES

This appendix contains documentation of the estimation procedures used by ORNL. The reader can examine the methodology behind the estimates and form an opinion as to their utility. The appendix is arranged by subject heading. Only tables which contain ORNL estimations are documented in Appendix A; all other tables have sources listed at the bottom of the table. Since abbreviations are used throughout the appendix, a list of abbreviations is also included.

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List of Abbreviations Used in Appendix A

AAMA	American Automobile Manufacturers Association
AAR	Association of American Railroads
APTA	American Public Transit Association
Amtrak	National Railroad Passenger Corporation
Btu	British thermal unit
DOC	Department of Commerce
DOE	Department of Energy
DOT	Department of Transportation
EIA	Energy Information Administration
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
GSA	General Services Administration
gvw	gross vehicle weight
lpg	liquefied petroleum gas
mpg	miles per gallon
NHTSA	National Highway Traffic Safety Administration
NPTS	Nationwide Personal Transportation Survey
NVPP	National Vehicle Population Profile
ORNL	Oak Ridge National Laboratory
pmt	passenger-miles traveled
RECS	Residential Energy Consumption Survey
RTECS	Residential Transportation Energy Consumption Survey
TIUS	Truck Inventory and Use Survey
TSC	Transportation Systems Center
VIUS	Vehicle Inventory and Use Survey
vmt	vehicle-miles traveled

Energy Use Sources

Highway energy use

Automobiles

Fuel use in gallons from: DOT, FHWA, *Highway Statistics 2000*, Table VM-1 and annual editions back to 1996; DOT, FHWA, *Highway Statistics Summary to 1995*. Fuel use was distributed among fuel types using the percentages shown in Table A1.

Table A.1
Automobile Fuel Use and Fuel Type Shares for Calculation of Energy Use

Year	Fuel use (million gallons)	Source for gasohol shares	Source for gasoline/diesel shares	Shares by fuel type		
				Gasoline	Gasohol	Diesel
1970	67,820		1984 NVPP	99.8%	0.0%	0.2%
1971	71,346		interpolated	99.2%	0.0%	0.8%
1972	75,937		interpolated	98.7%	0.0%	1.3%
1973	78,233		interpolated	98.1%	0.0%	1.9%
1974	74,229		interpolated	97.5%	0.0%	2.5%
1975	74,140		interpolated	97.0%	0.0%	3.0%
1976	78,297		interpolated	96.4%	0.0%	3.6%
1977	79,060		interpolated	95.8%	0.0%	4.2%
1978	80,652		interpolated	95.3%	0.0%	4.7%
1979	76,588		1979 RTECS	94.7%	0.0%	5.3%
1980	69,981	FHWA, MF-24	interpolated	93.9%	0.5%	5.6%
1981	69,112	FHWA, MF-24	1981 RTECS	93.4%	0.7%	5.9%
1982	69,116	FHWA, MF-24	interpolated	93.5%	2.3%	4.2%
1983	70,322	FHWA, MF-24	1983 RTECS	93.2%	4.3%	2.5%
1984	70,663	FHWA, MF-24	interpolated	92.7%	5.3%	2.0%
1985	71,518	FHWA, MF-24	1985 RTECS	90.8%	7.7%	1.5%
1986	73,174	FHWA, MF-24	interpolated	91.0%	7.6%	1.4%
1987	73,308	FHWA, MF-24	interpolated	92.4%	6.3%	1.3%
1988	73,345	FHWA, MF-24	1988 RTECS	91.4%	7.4%	1.2%
1989	73,913	FHWA, MF-24	interpolated	92.6%	6.2%	1.2%
1990	69,568	FHWA, MF-24	interpolated	92.0%	6.8%	1.2%
1991	64,318	FHWA, MF-24	1991 RTECS	90.8%	8.0%	1.2%
1992	65,436	FHWA, MF-24	interpolated	90.8%	7.9%	1.2%
1993	67,047	FHWA, MF-24	interpolated	89.7%	9.1%	1.3%
1994	67,874	FHWA, MF-24	1994 RTECS	89.1%	9.6%	1.3%
1995	68,072	FHWA, MF-24	interpolated	87.6%	11.2%	1.2%
1996	69,221	FHWA, MF-24	interpolated	88.8%	10.1%	1.0%
1997	69,892	FHWA, MF-24	interpolated	86.9%	12.2%	0.9%
1998	71,695	FHWA, MF-24	interpolated	88.0%	11.2%	0.8%
1999	73,283	FHWA, MF-24	interpolated	88.3%	11.0%	0.6%
2000	72,916	FHWA, MF-24	2000 NVPP	86.9%	12.6%	0.5%
Heat content used for conversion to btu:				125,000 btu/gallon	120,900 btu/gallon	138,700 btu/gallon

Motorcycles

DOT, FHWA, *Highway Statistics 2000*, Table VM-1, and annual editions.

Table A.2
Motorcycle Fuel Use

Year	Fuel use (million gallons)	Year	Fuel use (million gallons)
1970	59580000	1986	187,940,000
1971	72,140,000	1987	190,120,000
1972	86,620,000	1988	200,480,000
1973	103,880,000	1989	207,420,000
1974	108,900,000	1990	191,140,000
1975	112,580,000	1991	183,560,000
1976	120,060,000	1992	191,140,000
1977	126,980,000	1993	198,120,000
1978	143,160,000	1994	204,800,000
1979	172,740,000	1995	198,262,073
1980	204,280,000	1996	195,940,000
1981	213,800,000	1997	201,620,000
1982	198,200,000	1998	205,660,000
1983	175,200,000	1999	211,680,000
1984	175,680,000	2000	209,580,000
1985	181720000		
Heat content used for conversion to btu:		125,000 btu/gallon	

Buses

Transit:

APTA, *2001 Transit Fact Book*, 2000, Washington, DC. Data are not available for alternative fuels before 1992.

Table A.3
Transit Bus Fuel Use

Year	Methanol (thousand gallons)	LNG (thousand gallons)	LPG (thousand gallons)	CNG (thousand gallons)	Gasoline (thousand gallons)	Diesel fuel (thousand gallons)	Electricity (million kilowatt hours)
1992	1,583	191	2,487	1,009	32,906	592,049	80,000
1993	4,975	474	2,098	1,579	37,928	575,740	79,000
1994	12,269	1,450	1,871	4,835	43,921	565,064	103,000
1995	11,174	2,236	3,686	10,740	42,769	563,767	100,000
1996	7,268	2,862	5,235	15,092	41,495	577,680	69,000
1997	965	4,030	5,150	23,906	41,547	597,636	78,000
1998	958	5,331	6,631	37,268	35,645	606,631	74,000
1999	1,433	7,672	5,604	44,398	32,699	618,204	75,000
2000	131	12,567	4,988	54,794	29,908	635,160	77,000
Heat content used for conversion to btu:	64,600 btu/gallon	90,800 btu/gallon	91,300 btu/gallon	129,400 btu/gallon	125,000 btu/gallon	138,700 btu/gallon	11,765 btu/kWhr

Intercity and School:

Eno Transportation Foundation, *Transportation in America 2000*, Eighteenth Edition, 2001, Washington, DC, pp. 20–23. School bus fuel was assumed to be 90% diesel fuel and 10% gasoline based on estimates from the National Association of State Directors of Pupil Transportation Services. Intercity bus fuel was assumed to be 100% diesel. Because the 2000 data were not available at the time this report went to press, the 1999 data were used again for 2000.

Table A.4
Intercity and School Bus Fuel Use

Year	Intercity (million gallons)	School (million gallons)
1970	305.34	299.88
1971	296.73	309.75
1972	288.12	319.62
1973	252.42	327.04
1974	216.72	334.46
1975	181.02	341.88
1976	182.28	389.76
1977	181.86	401.52
1978	180.18	406.98
1979	205.38	404.88
1980	213.78	379.68
1981	205.38	386.82
1982	227.22	398.58
1983	237.30	400.68
1984	169.26	375.06
1985	165.48	425.04
1986	148.68	462.42
1987	155.82	487.20
1988	160.44	511.14
1989	166.74	498.12
1990	159.60	472.08
1991	160.44	533.40
1992	157.08	546.00
1993	171.36	533.40
1994	195.30	546.00
1995	195.30	545.16
1996	199.92	545.16
1997	212.52	544.74
1998	220.08	550.20
1999	241.08	555.66
2000	Not available	Not available
Fuel type shares	100% diesel	90% diesel 10% gasoline
Heat content used for conversion to btu:	138,700 btu/gallon	138,700 btu/gallon 125,000 btu/gallon

Trucks

Light Trucks:DOT, FHWA, *Highway Statistics 2000*, Table VM-1 and annual editions back to 1996;DOT, FHWA, *Highway Statistics Summary to 1995*.

Table A.5
Light Truck Fuel Use and Fuel Type Shares for Calculation of Energy Use

Year	Fuel use (million gallons)	Source for gasohol shares	Source for gasoline/diesel /lpg shares	Shares by fuel type			
				Gasoline	Gasohol	Diesel	Lpg
1970	12,313		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1971	13,484		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1972	15,150		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1973	16,828		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1974	16,657		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1975	19,081		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1976	20,828		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1977	22,383		1977 TIUS	97.6%	0.0%	1.6%	0.8%
1978	24,162		Interpolated	97.1%	0.0%	2.0%	0.9%
1979	24,445		Interpolated	96.7%	0.0%	2.4%	1.0%
1980	23,796	FHWA, MF-24	Interpolated	95.7%	0.5%	2.7%	1.0%
1981	23,697	FHWA, MF-24	Interpolated	95.1%	0.7%	3.1%	1.1%
1982	22,702	FHWA, MF-24	1982 TIUS	93.0%	2.3%	3.5%	1.2%
1983	23,945	FHWA, MF-24	Interpolated	91.0%	4.3%	3.5%	1.2%
1984	25,604	FHWA, MF-24	Interpolated	90.0%	5.3%	3.5%	1.2%
1985	27,363	FHWA, MF-24	Interpolated	87.6%	7.7%	3.5%	1.2%
1986	29,074	FHWA, MF-24	Interpolated	87.7%	7.6%	3.5%	1.2%
1987	30,598	FHWA, MF-24	1987 TIUS	89.0%	6.3%	3.5%	1.2%
1988	32,653	FHWA, MF-24	Interpolated	88.2%	7.4%	3.5%	1.0%
1989	33,271	FHWA, MF-24	Interpolated	89.5%	6.2%	3.4%	0.8%
1990	35,611	FHWA, MF-24	Interpolated	89.2%	6.8%	3.4%	0.7%
1991	38,217	FHWA, MF-24	Interpolated	88.1%	8.0%	3.3%	0.5%
1992	40,929	FHWA, MF-24	1992 TIUS	88.5%	7.9%	3.3%	0.3%
1993	42,851	FHWA, MF-24	Interpolated	87.3%	9.1%	3.3%	0.3%
1994	44,112	FHWA, MF-24	Interpolated	86.8%	9.6%	3.3%	0.3%
1995	45,605	FHWA, MF-24	Interpolated	85.1%	11.2%	3.4%	0.3%
1996	47,354	FHWA, MF-24	Interpolated	86.2%	10.1%	3.4%	0.3%
1997	49,388	FHWA, MF-24	1997 VIUS	84.2%	12.2%	3.4%	0.2%
1998	50,462	FHWA, MF-24	1997 VIUS	85.2%	11.2%	3.4%	0.2%
1999	52,859	FHWA, MF-24	1997 VIUS	85.4%	11.0%	3.4%	0.2%
2000	52,832	FHWA, MF-24	1997 VIUS	83.8%	12.6%	3.4%	0.2%
Heat content used for conversion to btu:				125,000 btu/gallon	120,900 btu/gallon	138,700 btu/gallon	90,800 btu/gallon

Medium/Heavy Trucks:

DOT, FHWA, *Highway Statistics 1999*, Table VM-1 and annual editions back to 1996;
 DOT, FHWA, *Highway Statistics Summary to 1995*. Total gallons for other
 trucks was the difference between total and 2-axle, 4-tire trucks.

Table A.6
Medium/Heavy Truck Fuel Use and Fuel Type Shares
for Calculation of Energy Use

Year	Fuel use (million gallons)	Source for gasoline/diesel /lpg shares	Shares by fuel type		
			Gasoline	Diesel	Lpg
1970	11,316	1977 TIUS	10.4%	89.5%	0.1%
1971	11,812	1977 TIUS	10.4%	89.5%	0.1%
1972	12,964	1977 TIUS	10.4%	89.5%	0.1%
1973	14,320	1977 TIUS	10.4%	89.5%	0.1%
1974	14,341	1977 TIUS	10.4%	89.5%	0.1%
1975	14,598	1977 TIUS	10.4%	89.5%	0.1%
1976	15,408	1977 TIUS	10.4%	89.5%	0.1%
1977	17,082	1977 TIUS	10.4%	89.5%	0.1%
1978	19,121	Interpolated	16.2%	83.5%	0.3%
1979	19,913	Interpolated	22.1%	77.5%	0.5%
1980	19,960	Interpolated	27.9%	71.4%	0.6%
1981	20,376	Interpolated	33.8%	65.4%	0.8%
1982	20,386	1982 TIUS	39.6%	59.4%	1.0%
1983	20,761	Interpolated	35.6%	63.6%	0.8%
1984	21,428	Interpolated	31.5%	67.8%	0.7%
1985	21,405	Interpolated	27.5%	72.0%	0.5%
1986	21,861	Interpolated	23.4%	76.2%	0.4%
1987	22,513	1987 TIUS	19.4%	80.4%	0.2%
1988	22,925	Interpolated	18.8%	81.0%	0.3%
1989	23,512	Interpolated	18.1%	81.6%	0.3%
1990	24,490	Interpolated	17.5%	82.1%	0.4%
1991	24,981	Interpolated	16.8%	82.7%	0.4%
1992	25,453	1992 TIUS	16.2%	83.3%	0.5%
1993	26,236	Interpolated	15.4%	84.1%	0.5%
1994	27,685	Interpolated	14.7%	84.8%	0.5%
1995	28,828	Interpolated	13.9%	85.6%	0.5%
1996	29,601	Interpolated	13.2%	86.3%	0.5%
1997	29,878	1997 VIUS	12.4%	87.1%	0.5%
1998	30,841	1997 VIUS	12.4%	87.1%	0.5%
1999	33,909	1997 VIUS	12.4%	87.1%	0.5%
2000	35,193	1997 VIUS	12.4%	87.1%	0.5%
Heat content used for conversion to btu:			125,000	138,700	90,800
			btu/gallon	btu/gallon	btu/gallon

Off-highway energy use

Diesel:

DOE, EIA, *Fuel Oil and Kerosene Sales 2000*, Table 1. Unadjusted sales of distillate.

Gasoline:

DOT, FHWA, *Highway Statistics 1999*, Table MF-24.

Table A.7
Off-Highway Fuel Use

Year	Gasoline (thousand gallons)		Diesel (thousand gallons)	
	Agriculture	Construction	Agriculture	Construction
1985	1,080,677	250,935	3,102,106	1,522,041
1986	964,226	275,997	3,340,813	1,659,365
1987	921,692	278,767	2,998,681	1,559,873
1988	806,097	275,927	3,162,575	1,671,387
1989	821,612	297,577	3,360,092	1,689,651
1990	681,220	318,184	3,403,400	1,808,646
1991	776,217	278,237	3,158,477	1,641,560
1992	805,511	272,896	3,499,518	1,757,788
1993	845,320	245,299	3,410,827	2,104,299
1994	903,682	266,560	3,270,227	2,153,153
1995	926,732	280,046	3,476,472	2,173,054
1996	918,085	283,911	3,591,383	2,245,922
1997	984,450	300,491	3,547,699	2,276,548
1998	906,941	234,705	3,410,801	2,477,199
1999	702,700	177,758	3,411,623	2,490,492
2000	652,256	191,516	3,454,861	2,589,383
Heat content used for conversion to btu:	125,000 btu/gallon	125,000 btu/gallon	138,700 btu/gallon	138,700 btu/gallon

Nonhighway energy use

Air

General Aviation:

DOT, FAA, *General Aviation Activity and Avionics Survey: Annual Summary Report Calendar Year 2000*, Table 5.1, and annual.

Table A.8
General Aviation Fuel Use

Year	Jet fuel (million gallons)	Aviation gasoline (million gallons)
1970	208.0	551.0
1971	226.0	508.0
1972	245.0	584.0
1973	304.0	411.0
1974	357.0	443.0
1975	453.0	412.0
1976	495.0	432.0
1977	536.0	456.0
1978	763.0	518.0
1979	736.0	570.0
1980	766.0	520.0
1981	759.0	489.0
1982	887.0	448.0
1983	613.0	428.0
1984	738.9	462.4
1985	691.0	421.0
1986	732.1	408.6
1987	672.7	401.8
1988	746.0	398.0
1989	688.0	342.8
1990	662.0	353.0
1991	579.0	348.0
1992	496.0	306.0
1993	454.1	268.4
1994	470.8	264.1
1995	544.0	276.0
1996	567.5	286.5
1997	639.4	289.7
1998	814.6	311.4
1999	967.2	345.4
2000	998.1	336.3
Heat content used for conversion to btu:	135,000 btu/gallon	120,200 btu/gallon

Domestic and International Air Carrier:

DOT, Bureau of Transportation Statistics, "Fuel Cost and Consumption Tables."

Because the data for international included fuel purchased abroad, the international total was divided in half to estimate domestic fuel use for international flights.

Table A.9
Air Carrier Fuel Use

Year	Domestic (thousand gallons)	International (thousand gallons)	Total (thousand gallons)
1970			10,085,000
1971			10,140,000
1972	Separate estimates for domestic and		10,302,000
1973	international are not available from		10,671,000
1974	1970-1976.		10,417,260
1975			10,412,640
1976			10,400,040
1977	8,202,051	1,708,376	9,910,427
1978	8,446,117	1,741,918	10,188,035
1979	8,865,885	1,828,435	10,694,320
1980	8,519,233	1,747,306	10,266,539
1981	8,555,249	2,032,520	10,587,769
1982	8,432,465	1,967,733	10,400,198
1983	8,672,574	1,998,289	10,670,863
1984	9,625,958	2,286,407	11,912,365
1985	10,115,007	2,487,929	12,602,936
1986	11,137,331	2,544,996	13,682,327
1987	11,586,838	2,893,617	14,480,455
1988	11,917,904	3,262,824	15,180,728
1989	11,905,144	3,557,294	15,462,438
1990	12,429,305	3,963,081	16,392,386
1991	11,506,477	3,939,666	15,446,144
1992	11,762,852	4,120,132	15,882,983
1993	11,958,663	4,113,321	16,071,984
1994	12,475,549	4,310,879	16,786,428
1995	12,811,717	4,511,418	17,323,135
1996	13,187,305	4,658,093	17,845,398
1997	13,659,581	4,964,181	18,623,762
1998	13,876,971	5,185,562	19,062,533
1999	14,402,127	5,250,492	19,652,619
2000	14,844,592	5,474,685	20,319,277
2001	14,017,461	5,237,487	19,254,948
Heat content used for conversion to btu:	135,000 btu/gallon	135,000 btu/gallon	135,000 btu/gallon

Water

Freight:

Total - DOE, EIA, *Fuel Oil and Kerosene Sales 2000*, Table 23. Adjusted sales of distillate and residual fuel oil for vessel bunkering. (This may include some amounts of bunker fuels used for recreational purposes.)

Table A.10
Diesel and Residual Fuel Oil for Vessel Bunkering

Year	Distillate fuel oil (thousand gallons)	Residual fuel oil (thousand gallons)
1970	819,000	3,774,120
1971	880,000	3,307,000
1972	1,013,000	3,273,000
1973	1,125,000	3,859,000
1974	1,018,920	3,827,040
1975	1,097,880	4,060,140
1976	1,220,100	4,977,000
1977	1,407,420	5,416,740
1978	1,578,822	6,614,790
1979	1,630,858	8,002,672
1980	717,376	7,454,242
1981	1,723,143	7,922,512
1982	1,423,216	6,408,818
1983	1,418,890	5,724,115
1984	1,692,141	5,687,375
1985	1,894,016	5,473,614
1986	2,034,215	5,287,347
1987	2,223,258	5,259,272
1988	2,310,367	5,248,981
1989	2,356,444	5,410,263
1990	2,197,004	6,248,095
1991	2,167,640	6,786,055
1992	2,240,170	7,199,078
1993	2,043,745	6,269,882
1994	2,026,899	5,944,383
1995	1,978,105	6,431,238
1996	2,177,608	5,804,977
1997	2,107,561	4,789,861
1998	2,125,568	4,640,153
1999	2,064,590	5,598,630
2000	2,080,599	7,485,487
Heat content used for conversion to btu:	138,700 btu/gallon	btu/gallon

Recreational Boating:

Fuel use by recreational boating from 1977-on was calculated using the methodology developed by D. L. Greene in the report, *Off-Highway Use of Gasoline in the United States* (DOT, FHWA, July 1986, p. 3-22). Results from Model 1 in the report indicated an average annual consumption of 205 gallons per boat. Total consumption in gallons was then calculated using the following equation: Total = 0.95 (Gal/boat) (number of boats). An estimate of number of recreational boats in operation is from the U.S. Coast Guard (numbered boats). Fuel use for recreational boating from 1970 to 1976 was from FHWA, *Highway Statistics, 1976*, Table MF-24, and annual editions 1970-75.

Table A11
Recreational Boating Fuel Use

Year	Number of numbered boats	Source	Estimated gasoline use (thousand gallons)
1970		FHWA, MF-24	598,000
1971		FHWA, MF-24	645,000
1972		FHWA, MF-24	687,000
1973		FHWA, MF-24	717,000
1974		FHWA, MF-24	696,780
1975		FHWA, MF-24	729,540
1976		FHWA, MF-24	763,980
1977	7,975,587		1,553,246
1978	8,035,905		1,564,992
1979	8,278,723		1,612,281
1980	8,577,857		1,670,538
1981	8,905,097		1,734,268
1982	9,073,972	Multiply by:	1,767,156
1983	9,165,094	0.95 ×	1,784,902
1984	9,420,011	205 gallons/boat	1,834,547
1985	9,589,483		1,867,552
1986	9,876,197		1,923,389
1987	9,963,696		1,940,430
1988	10,362,613		2,018,119
1989	10,777,370		2,098,893
1990	10,996,253		2,141,520
1991	11,068,440		2,155,579
1992	11,132,386		2,168,032
1993	11,282,736		2,197,313
1994	11,429,585		2,225,912
1995	11,734,710		2,285,335
1996	11,877,938		2,313,228
1997	12,312,982		2,397,953
1998	12,565,930		2,447,215
1999	12,738,271		2,480,778
2000	12,782,143		2,489,322
Heat content used for conversion to btu:			125,000
			btu/gallon

Pipeline

The sum of natural gas, crude petroleum and petroleum product, and coal slurry and water.

Natural Gas:

The amount of natural gas used to transport natural gas was defined as "pipeline fuel" as reported in DOE, EIA, *Natural Gas Annual 2000*, Table 1. Cubic feet were converted to Btu using 1,031 Btu/ft³. Electricity use was estimated using the following procedure as reported on p. 5-110 of J. N. Hooker et al., *End Use Energy Consumption DataBase: Transportation Sector*. The energy consumption of a natural gas pipeline was taken to be the energy content of the fuel used to drive the pumps. Some 94% of the installed pumping horsepower was supplied by natural gas. The remaining 6% of the horse power was generated more efficiently, mostly by electric motors. The energy consumed by natural gas pipeline pumps that were electrically powered was not known. In order to estimate the electricity consumed, the Btu of natural gas pipeline fuel consumed was multiplied by a factor of 0.015. From this computed value, electricity efficiency and generation loss must be taken into account. The electricity energy use in Btu must be converted to kWhr, using the conversion factor 29.305×10^{-5} kWhr/Btu. Electricity generation and distribution efficiency was 29%. When generation and distribution efficiency are taken into account, 1 kWhr equals 11,765 Btu.

Crude petroleum and petroleum product:

J. N. Hooker, *Oil Pipeline Energy Consumption and Efficiency*, ORNL-5697, ORNL, Oak Ridge, TN, 1981. (Data held constant; Latest available data.)

Coal slurry and water:

W. F. Banks, Systems, Science and Software, *Energy Consumption in the Pipeline Industry*, LaJolla, CA, October 1977. (Data held constant; Latest available data.)

Table A.12
Pipeline Fuel Use

Year	Natural gas (million cubic feet)	Formula for estimating electricity use	Estimated electricity use (million kWhr)	Electricity constant (btu)
1970	722,166		3,272.9	212.1
1971	742,592		3,365.4	212.1
1972	766,156	Multiply natural gas by	3,472.2	212.1
1973	728,177	heat content to get btu	3,300.1	212.1
1974	668,792	× 0.015	3,031.0	212.1
1975	582,963	× (29.305 × 10 ⁻⁵ kWhr/btu)	2,642.0	212.1
1976	548,323		2,485.0	212.1
1977	532,669		2,414.1	212.1
1978	530,451		2,404.0	212.1
1979	600,964		2,723.6	212.1
1980	634,622		2,876.1	212.1
1981	642,325		2,911.0	212.1
1982	596,411		2,703.0	212.1
1983	490,042		2,220.9	212.1
1984	528,754		2,396.3	212.1
1985	503,766		2,283.1	212.1
1986	485,041		2,198.2	212.1
1987	519,170		2,352.9	212.1
1988	613,912		2,782.3	212.1
1989	629,308		2,852.0	212.1
1990	659,816		2,990.3	212.1
1991	601,305		2,725.1	212.1
1992	587,710		2,663.5	212.1
1993	624,308		2,829.4	212.1
1994	685,362		3,106.1	212.1
1995	700,335		3,173.9	212.1
1996	711,446		3,224.3	212.1
1997	751,470		3,405.7	212.1
1998	635,477		2,880.0	212.1
1999	645,319		2,924.6	212.1
2000	644,444		2,920.6	212.1
Heat content used for conversion to btu:	1,031 btu/cubic foot		11,765 Btu/kWhr	

Rail

Freight:AAR, *Railroad Facts*, 2001 Edition, Washington, DC, 2001.

Table A.13
Class I Freight Railroad
Fuel Use

Year	Diesel fuel (thousand gallons)
1970	3,807,663
1971	3,822,907
1972	3,996,985
1973	4,160,730
1974	4,175,375
1975	3,736,484
1976	3,895,542
1977	3,985,069
1978	3,968,007
1979	4,072,187
1980	3,955,996
1981	3,756,439
1982	3,178,116
1983	3,137,295
1984	3,388,173
1985	3,144,190
1986	3,039,069
1987	3,102,227
1988	3,182,267
1989	3,190,815
1990	3,134,446
1991	2,925,970
1992	3,022,108
1993	3,111,981
1994	3,355,802
1995	3,503,096
1996	3,600,649
1997	3,602,793
1998	3,619,341
1999	3,749,428
2000	3,720,107
Heat content used for conversion to btu:	138,700 Btu/gallon

Passenger:

Commuter - APTA, 2002 Transit Fact Book, Washington, DC, 2002.

Table A.14
Commuter Rail Fuel Use

Year	Diesel (thousand gallons)	Electricity (million kWhr)
1984	58,320	901
1985	55,372	1,043
1986	54,608	1,170
1987	51,594	1,155
1988	53,054	1,195
1989	52,516	1,293
1990	52,681	1,226
1991	54,315	1,239
1992	54,951	1,124
1993	59,766	1,196
1994	61,900	1,244
1995	63,064	1,253
1996	61,888	1,255
1997	63,195	1,270
1998	69,200	1,299
1999	73,005	1,322
2000	70,818	1,370
Heat content used for conversion to btu:	138,700 Btu/gallon	11,765 Btu/kWhr

Transit - APTA, 2002 Transit Fact Book, Washington, DC, 2002. Includes light rail and heavy rail.

Table A.15
Transit Rail Fuel Use

Year	Electricity (million kWhr)		Total
	Light rail	Heavy rail	
1970			2,561
1971			2,556
1972			2,428
1973			2,331
1974			2,630
1975			2,646
1976	Light rail and heavy rail data are not available separately from 1970 to 1985.		2,576
1977			2,303
1978			2,223
1979			2,473
1980			2,446
1981			2,655
1982			2,722
1983			2,930
1984			3,092
1985			2,928
1986	173	3,066	3,239
1987	191	3,219	3,410
1988	243	3,256	3,499
1989	242	3,286	3,528
1990	239	3,284	3,523
1991	274	3,248	3,522
1992	297	3,193	3,490
1993	281	3,287	3,568
1994	282	3,431	3,713
1995	288	3,401	3,689
1996	321	3,322	3,643
1997	361	3,253	3,614
1998	381	3,280	3,661
1999	416	3,385	3,801
2000	463	3,549	4,012
Heat content used for conversion to btu:	11,765 Btu/kWhr	11,765 Btu/kWhr	11,765 Btu/kWhr

Intercity - Personal communication with Amtrak, Washington, DC.

Table A.16
Intercity Rail Fuel Use

Year	Diesel fuel (thousand gallons)	Electricity (thousand kWhr)
1994	73,516	308,948
1995	72,371	335,818
1996	71,226	362,689
1997	75,656	389,559
1998	75,999	416,429
1999	79,173	443,300
2000	76,759	470,170
Heat content used for conversion to btu:	138,700 Btu/gallon	11,765 Btu/kWhr

Calculation of Million Barrels per Day Crude Oil Equivalent

One gallon of gasoline, diesel fuel, or lpg is estimated to be the equivalent of one gallon of crude oil. Petroleum used for electricity was calculated using the following formula:

$$(\{[(BTU*S)/G]/P \}/365)/1000$$

- BTU = Btus of electricity from Table 2.4
 S = Share of petroleum used in making primary electricity (Calculated from Table 2.6 from the EIA, *Monthly Energy Review*)
 G = Electricity generation and distribution (assumed 29%)
 P = Btus per barrel of petroleum product (Table A3 from the EIA, *Monthly Energy Review*).

Passenger Travel and Energy Use

Automobiles

Number of vehicles, vehicle-miles - DOT, FHWA, *Highway Statistics, 2000*, Table VM-1. Data series shown in Table 7.1.

Passenger-miles - Vehicle-miles multiplied by an average load factor.

Load factor - 1995 NPTS shows automobile load factor as 1.6 persons per vehicle.

Energy intensities -

Btu per vehicle-mile - Automobile energy use divided by vehicle-miles.

Btu per passenger-mile - Automobile energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-3. Data series shown in Table 2.6.

Light trucks

Number of vehicles, vehicle-miles - DOT, FHWA, *Highway Statistics 2000*, Table VM-1. Data by truck type were multiplied by the shares of trucks/truck travel which are for personal use (Table A16).

Passenger-miles - Vehicle-miles multiplied by an average load factor.

Load factor - 1995 NPTS shows personal light truck load factor as 1.6 persons per vehicle.

Energy intensities -

Btu per vehicle-mile - Personal light truck energy use divided by personal light truck vehicle-miles.

Btu per passenger-mile - Personal light truck energy use divided by personal light truck passenger-miles.

Energy use - See Energy Use Sources, p. A-6, A-7 (light trucks, medium/heavy trucks). Data by truck type were multiplied by the shares of truck fuel use which are for personal use (Table A17) which were derived by ORNL from the 1997 VIUS Micro Data File on CD.

Table A.17
Share of Trucks, Truck Travel,
and Fuel Use for Personal Travel

Personal trucks	
75.2%	2-axle, 4-tire trucks
16.9%	Other single-unit and combination trucks
Personal truck travel	
70.7%	2-axle, 4-tire trucks
7.1%	Other single-unit and combination trucks
Personal truck fuel use	
68.5%	2-axle, 4-tire trucks
3.7%	Other single-unit and combination trucks

Motorcycles

Number of vehicles, vehicle-miles - DOT, FHWA, *Highway Statistics 2000*, Table VM-1.

Passenger-miles - Vehicle-miles multiplied by an average load factor.

Load factor - 1995 NPTS shows motorcycle load factor as 1.2 persons per vehicle.

Energy intensities -

Btu per vehicle-mile - Motorcycle energy use divided by vehicle-miles.

Btu per passenger-mile - Motorcycle energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-4. Data series shown in Table 2.6.

Buses

Transit

Number of vehicles, vehicle miles, passenger miles - APTA, *2002 Public Transportation Fact Book*, Washington, DC, 2002. Data series shown on Table 8.12.

Load factor - Passenger-miles divided by vehicle-miles.

Energy intensities -

Btu per vehicle-mile - Transit bus energy use divided by transit bus vehicle-miles.

Btu per passenger-mile - Transit bus energy use divided by transit bus passenger-miles.

Energy use - See Energy Use Sources, p. A-4. Data series shown in Table 8.12.

Intercity

Passenger-miles - Eno Foundation for Transportation, *Transportation in America 2000*, Eighteenth edition, Washington, DC. Data series shown in Table 8.13. Because the 2000 data were not available at the time this report went to press, the 1999 data were used again for 2000.

Energy intensities -

Btu per passenger-mile - Intercity bus energy use divided by intercity bus passenger-miles.

Energy use - See Energy Use Sources, p. A-5. Data series shown in Table 8.13. Because the 2000 data were not available at the time this report went to press, the 1999 data were used again for 2000.

School

Number of vehicles - DOT, FHWA, *Highway Statistics 2000*, Table MV-10. Data series shown in Table 8.13.

Energy use - See Energy Use Sources, p. A-5. Data series shown in Table 8.13. Because the 2000 data were not available at the time this report went to press, the 1999 data were used again for 2000.

Air

Certificated air carriers

Aircraft-miles, passenger-miles - DOT, BTS, *Air Carrier Traffic Statistics Monthly, December 2001/2000*, Washington, DC.

Load factor - Passenger-miles divided by aircraft-miles.

Energy intensities -

Btu per passenger-mile - Certificated air carrier energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-10. All of domestic fuel use and half of international fuel use was considered to be domestic use.

Note: These data differ from the data in Table 12.1 because that table contains data on ALL domestic AND international air carrier energy use and passenger-miles.

General aviation

Number of vehicles - DOT, FAA, *General Aviation Activity and Avionics Survey: Calendar Year 2000*. Data series shown in Table 12.2.

Passenger-miles - Eno Foundation for Transportation, *Transportation in America 2000*, Eighteenth edition, Washington, DC. Data series shown in Table 12.2.

Energy intensities -

Btu per passenger-mile - General aviation energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-9. Data series shown in Table 12.2.

Recreational boating

Number of vehicles - DOT, U.S. Coast Guard, Office of Boating Safety, Washington, DC, 2002.

Energy use - See Energy Use Sources, p. A-12.

Rail

Intercity

Number of vehicles, vehicle-miles, passenger-miles - AAR, *Railroad Facts, 2001 Edition*, Washington, DC, 2001.

Load factor - Passenger-miles divided by vehicle-miles.

Energy Intensities -

Btu per vehicle-mile - Intercity rail energy use divided by vehicle-miles.

Btu per passenger-mile - Intercity rail energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-18. Data series shown in Table 12.11.

Transit

Number of vehicles, vehicle-miles, passenger-miles - APTA, *2002 Public Transportation Fact Book*, Washington, DC, 2002. Sum of light and heavy rail transit. Data series shown on Table 12.13.

Load factor - Passenger-miles divided by vehicle-miles.

Energy intensities -

Btu per vehicle-mile - Light and heavy transit rail energy use divided by vehicle-miles.

Btu per passenger-mile - Light and heavy transit rail energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-17. Data series shown in Table 12.13.

Commuter

Number of vehicles, vehicle-miles, passenger-miles - APTA, *2002 Public Transportation Fact Book*, Washington, DC, 2002. Data series shown on Table 12.12.

Load factor - Passenger-miles divided by vehicle-miles.

Energy intensities -

Btu per vehicle-mile - Commuter rail energy use divided by vehicle-miles.

Btu per passenger-mile - Commuter rail energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-16. Data series shown in Table 12.12.

Highway Passenger Mode Energy Intensities

Automobiles

Btu per vehicle-mile - Automobile energy use divided by automobile vehicle miles of travel.

Energy use - See Energy Use Sources, p. A-3. Data series shown in Table 2.6.

Vehicle miles - DOT, FHWA, *Highway Statistics 2000*, Table VM-1 and annual editions back to 1996; DOT, FHWA, *Highway Statistics Summary to 1995*. Data series shown in Table 7.1.

Btu per passenger-mile - Automobile energy use divided by automobile passenger-miles.

Energy use - See Energy Use Sources, p. A-3. Data series shown in Table 2.6.

Passenger miles - Vehicle miles multiplied by an average load factor.

Vehicle miles - DOT, FHWA, *Highway Statistics 2000*, Table VM-1 and annual editions back to 1996; DOT, FHWA, *Highway Statistics Summary to 1995*. Data series shown in Table 7.1.

Load factor - NPTS 1969, 1977, 1983/84, 1990, and 1995.

Table A.18
Automobile Load Factor used to calculate Passenger-Miles

Year	Source	Load Factor
1970	1969 NPTS	1.90
1971	Interpolated	1.90
1972	Interpolated	1.90
1973	Interpolated	1.90
1974	Interpolated	1.90
1975	Interpolated	1.90
1976	Interpolated	1.90
1977	1977 NPTS	1.90
1978	Interpolated	1.88
1979	Interpolated	1.87
1980	Interpolated	1.85
1981	Interpolated	1.83
1982	Interpolated	1.82
1983	1983/84 NPTS	1.80
1984	Interpolated	1.77
1985	Interpolated	1.74
1986	Interpolated	1.71
1987	Interpolated	1.69
1988	Interpolated	1.66
1989	Interpolated	1.63
1990	1990 NPTS	1.60
1991	Interpolated	1.60
1992	Interpolated	1.60
1993	Interpolated	1.60
1994	Interpolated	1.60
1995	1995 NPTS	1.60
1996	1995 NPTS	1.60
1997	1995 NPTS	1.60
1998	1995 NPTS	1.60
1999	1995 NPTS	1.60
2000	1995 NPTS	1.60

Light trucks

Btu per vehicle-mile - Light truck energy use divided by light truck vehicle miles of travel.

Energy use - See Energy Use Sources, p. A-6. Data series shown in Table 2.6.

Vehicle miles - DOT, FHWA, *Highway Statistics 2000*, Table VM-1 and annual editions back to 1996; DOT, FHWA, *Highway Statistics Summary to 1995*. Data series shown in Table 7.2.

Buses

Transit

Btu per vehicle-mile - Transit bus energy use divided by transit bus vehicle-miles.

Energy use - See Energy Use Sources, p. A-4. Data series shown in Table 8.12.

Vehicle miles - APTA, *2002 Public Transportation Fact Book*, Washington, DC, 2002. Data series shown on Table 8.12.

Btu per passenger-mile - Transit bus energy use divided by transit bus passenger-miles.

Energy use - See Energy Use Sources, p. A-4. Data series shown in Table 8.12.

Passenger miles - APTA, *2002 Public Transportation Fact Book*, Washington, DC, 2002. Data series shown on Table 8.12.

Intercity

Btu per passenger-mile - Intercity bus energy use divided by intercity bus passenger-miles.

Energy use - See Energy Use Sources, p. A-5. Data series shown in Table 8.13. Because the 2000 data were not available at the time this report went to press, the 1999 data were used again for 2000.

Passenger-miles - Eno Foundation for Transportation, *Transportation in America 2000*, Eighteenth edition, Washington, DC. Data series shown in Table 8.13. Because the 2000 data were not available at the time this report went to press, the 1999 data were used again for 2000.

Nonhighway Mode Energy Intensities

Air

Certificated air carriers

Btu per passenger-mile - Certificated air carrier energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-10. All of domestic fuel use and half of international fuel use was considered to be domestic use.

Passenger-miles - DOT, BTS, *Air Carrier Traffic Statistics Monthly, December 2001/2000*, Washington, DC, and annual editions back to 1994. Pre-1994 data are from various editions of the *FAA Statistical Handbook of Aviation* (no longer published). Scheduled service passenger-miles of domestic air carriers and half of international air carriers were used to coincide with fuel use.

Note: These data differ from the data in Table 12.1 because that table contains data on ALL domestic AND international air carrier energy use and passenger-miles.

General aviation

Btu per passenger-mile - General aviation energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-9. Data series shown in Table 12.2.

Passenger-miles - Eno Foundation for Transportation, *Transportation in America 2000*, Eighteenth edition, Washington, DC. Data series shown in Table 12.2.

Rail

Intercity

Btu per passenger-mile - Intercity rail energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-18. Data series shown in Table 12.11.

Passenger-miles - AAR, *Railroad Facts, 2001 Edition*, and previous annual editions.

Transit

Btu per passenger-mile - Transit rail energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-17. Data series shown in Table 12.13.

Passenger-miles - APTA, *2002 Public Transportation Fact Book*, Washington, DC, 2002. Data series shown on Table 12.13.

Commuter

Btu per passenger-mile - Commuter rail energy use divided by passenger-miles.

Energy use - See Energy Use Sources, p. A-16. Data series shown in Table 12.12.

Passenger-miles - APTA, *2002 Public Transportation Fact Book*, Washington, DC, 2002. Data series shown on Table 12.12.

Freight Movement and Energy Use

Truck

Number of vehicles - DOT, FHWA, *Highway Statistics 2000*, Table VM-1. Data by truck type were multiplied by the shares of trucks engaged in intercity freight movement (Table A19).

Ton miles, tons shipped and average length of haul - Eno Transportation Foundation, *Transportation in America 2000*, Eighteenth Edition, Washington, DC, 2001.

Energy intensity - Freight truck energy use divided by ton-miles.

Energy use - See Energy Use Sources (light trucks, medium/heavy trucks), pp. A-6, A-7. Data by truck type were multiplied by the shares of trucks engaged in intercity freight movement (Table A19).

Table A.19
Share of Trucks and Truck Fuel Use
for Trucks Engaged in Intercity Freight Movement

Intercity freight trucks	
0.4%	2-axle, 4-tire trucks
29.0%	Other single-unit and combination trucks
Intercity freight truck fuel use	
1.0%	2-axle, 4-tire trucks
71.3%	Other single-unit and combination trucks

These percentages were derived by ORNL from the 1997 VIUS Micro Data File on CD. Intercity freight trucks were defined as any truck whose:

- greatest share of miles were traveled more than 50 miles away from the vehicle's home base;
- and**
- principal use was not personal or passenger transportation; **and**
- body type was not pickup, minivan, or utility vehicle.

Rail

Number of locomotives, ton-miles, tons shipped, average length of haul - AAR, *Railroad Facts, 2001 Edition*, Washington, DC, 2001. Data series shown in Table 12.8.

Energy intensity - Class I rail energy use divided by freight car-miles.

Energy use - See Energy Use Sources, p. A-15. Data series shown in Table 12.8.

Water

Number of vehicles - U.S. Department of the Army, Army Corps of Engineers, "Summary of U.S. Flag Passenger and Cargo Vessels, 2000," New Orleans, LA, 2001.

Ton-miles, tons shipped, average length of haul - U.S. Department of the Army, Army Corps of Engineers, *Waterborne Commerce of the United States, Calendar Year 2000*, Part 5: National Summaries, New Orleans, LA, 2001. Data series shown in Table 12.4.

Btu per ton-mile - Domestic waterborne commerce energy use divided by ton-miles.

Energy use - See Energy Use Sources, p. A-11. Data series shown in Table 12.4.

Freight Mode Energy Intensities

Truck

Btu per vehicle-mile - Heavy single-unit and combination truck energy use divided by vehicle miles

Energy use - See Energy Use Sources (medium/heavy trucks), p. A-7.

Vehicle-miles - DOT, FHWA, *Highway Statistics 2000*, Table VM-1 and annual editions back to 1996; DOT, FHWA, *Highway Statistics Summary to 1995*. Data series is the total of vehicle travel data on Tables 8.1 and 8.2.

Rail

Btu per freight car-mile - Class I rail energy use divided by freight car-miles.

Energy use - See Energy Use Sources, p. A-15. Data series shown in Table 12.8.

Freight car miles - AAR, *Railroad Facts, 2001 Edition*, Washington, DC, 2001. Data series shown in Table 12.8.

Btu per ton-mile - Class I rail energy use divided by ton-miles.

Energy use - See Energy Use Sources, p. A-15. Data series shown in Table 12.8.

Ton-miles - AAR, *Railroad Facts, 2001 Edition*, Washington, DC, 2001. Data series shown in Table 12.8.

Water

Btu per ton-mile - Domestic waterborne commerce energy use divided by ton-miles.

Energy use - See Energy Use Sources, p. A-11. Data series shown in Table 12.4.

Ton-miles - U.S. Department of the Army, Army Corps of Engineers, *Waterborne Commerce of the United States, Calendar Year 2000*, Part 5: National Summaries, New Orleans, LA, 2001. Data series shown in Table 12.4.

Highway Vehicle Stock and New Sales 2000 Calendar Year

Automobiles

Stock - Vehicle registrations by model year are from The Polk Company's National Vehicle Population Profile. Vehicles were distributed into size classes using the percentages in Table A.20. This method assumed that all vehicles, large and small, were scrapped at the same rate. Shares were generated from the ORNL MPG and Market Shares Database, 2002.

Table A.20
Shares by Automobile Size Class and Model Year

Year	Minicompact	Subcompact	Compact	Midsize	Large	Two-seater	Total
Pre-1977	7.1%	22.0%	16.4%	29.5%	23.0%	2.0%	100.0%
1977	7.2%	16.2%	25.7%	21.7%	27.4%	1.8%	100.0%
1978	8.5%	19.0%	15.2%	33.0%	22.3%	2.0%	100.0%
1979	5.5%	30.7%	8.4%	33.8%	19.4%	2.2%	100.0%
1980	4.7%	37.8%	6.6%	33.8%	14.7%	2.4%	100.0%
1981	3.3%	33.0%	13.4%	35.1%	12.5%	2.7%	100.0%
1982	2.9%	31.4%	17.0%	33.1%	13.0%	2.6%	100.0%
1983	2.6%	26.8%	22.0%	31.7%	14.5%	2.4%	100.0%
1984	0.4%	24.6%	27.1%	30.0%	14.7%	3.2%	100.0%
1985	0.6%	21.7%	32.1%	28.4%	13.8%	3.4%	100.0%
1986	1.8%	22.4%	33.2%	26.9%	13.2%	2.5%	100.0%
1987	1.4%	19.5%	39.1%	25.2%	12.5%	2.3%	100.0%
1988	0.8%	19.1%	40.5%	24.6%	13.2%	1.8%	100.0%
1989	0.2%	19.3%	36.2%	28.9%	13.8%	1.6%	100.0%
1990	0.9%	22.0%	34.2%	27.2%	13.9%	1.8%	100.0%
1991	0.9%	26.1%	29.5%	27.9%	13.9%	1.7%	100.0%
1992	1.2%	25.3%	30.6%	27.7%	14.1%	1.1%	100.0%
1993	0.9%	22.6%	32.3%	29.1%	14.2%	0.9%	100.0%
1994	0.5%	22.1%	35.2%	26.5%	14.9%	0.8%	100.0%
1995	0.5%	17.4%	37.8%	28.6%	15.1%	0.6%	100.0%
1996	0.4%	15.2%	40.3%	28.8%	14.6%	0.7%	100.0%
1997	0.5%	18.3%	35.5%	30.6%	14.1%	1.0%	100.0%
1998	0.2%	18.5%	28.6%	38.4%	13.0%	1.3%	100.0%
1999	0.1%	18.8%	27.4%	38.8%	13.7%	1.2%	100.0%
2000	0.2%	19.9%	26.7%	37.4%	14.4%	1.4%	100.0%

Business fleet autos - Bobit Publishing Company, Automotive Fleet Research Department,
Automotive Fleet Factbook 2001, Redondo Beach, CA, 2000.

Personal autos - Difference between total vehicle stock and business fleet autos.

Sales - Domestic and import totals are from *Ward's Motor Vehicle Facts and Figures 2001*. Domestic-sponsored imports (captive imports) were included in the import figure only. Domestic and import sales were distributed into size classes using the percentages in Table A21 from the ORNL MPG and Market Shares Database, 2002.

Table A.21
Automobile Sales Shares by Size Class, 2000

Size class	Domestic	Import
Two-seaters	0.8%	3.4%
Minicompact	0.0%	1.0%
Subcompact	21.5%	14.6%
Compact	23.8%	36.7%
Midsize	35.9%	42.4%
Large	18.0%	2.0%

See Glossary for definition of Automobile Size Classifications.

Trucks

Stock - Total truck population from The Polk Company, 2001. The trucks were distributed using shares of trucks by standard weight classes from VIUS 1997 (Table A22).

Table A.22
Share of Trucks by Weight Class

Weight classes	Share of trucks in the population
0 - 10,000 lbs	93.5%
10,001-19,500 lbs	2.0%
19,501-26,000 lbs	1.0%
26,001 lbs and over	3.5%
Total	100.0%

Then, the number of trucks in Class 2b were split from Classes 1 and 2 by model year (Polk NVPP data) using shares from ORNL's Class 2b study (Table A23).

Table A.23
Share of Class 1 and 2 Trucks
that are Class 2b Trucks (8,500-10,000 lbs)

Model Year	Share of class 2b trucks
Pre-1974	7.35%
1974	15.64%
1975	17.15%
1976	18.29%
1977	14.60%
1978	17.90%
1979	17.79%
1980	18.20%
1981	13.87%
1982	14.05%
1983	8.13%
1984	9.74%
1985	9.56%
1986	8.77%
1987	8.91%
1988	6.90%
1989	8.34%
1990	6.73%
1991	4.91%
1992	5.04%
1993	5.60%
1994	5.60%
1995	7.05%
1996	6.71%
1997	7.86%
1998	5.01%
1999	9.36%
2000	8.94%
2001	8.61%

Trucks less than 8,500 lbs (Classes 1 and 2a) were distributed into size classes using the percentages in Table A24. This method assumed that all vehicles, large and small, were scrapped at the same rate. Shares were generated from the ORNL MPG and Market Shares Database, 2002.

Table A.24
Shares by Light Truck Size Class and Model Year for Trucks under 8,500 lbs

Sales period	Small pickup	Large pickup	Small van	Large van	Small utility	Medium utility	Large utility	Total
Pre-1976	9.5%	66.1%	0.9%	21.1%	0.0%	2.0%	0.4%	100.0%
1976	7.1%	65.7%	0.8%	23.9%	0.0%	2.1%	0.4%	100.0%
1977	11.0%	68.5%	1.0%	16.6%	0.0%	2.5%	0.4%	100.0%
1978	10.5%	64.0%	0.8%	22.8%	0.1%	1.4%	0.4%	100.0%
1979	16.1%	58.5%	0.6%	20.7%	1.8%	1.9%	0.4%	100.0%
1980	23.3%	50.3%	0.6%	14.8%	2.3%	6.9%	1.8%	100.0%
1981	24.4%	50.0%	0.6%	16.9%	2.0%	4.7%	1.4%	100.0%
1982	27.2%	46.8%	0.6%	17.8%	1.3%	4.8%	1.5%	100.0%
1983	33.3%	35.7%	0.5%	18.0%	6.3%	4.5%	1.7%	100.0%
1984	23.7%	38.1%	6.2%	15.1%	10.6%	4.4%	1.9%	100.0%
1985	20.4%	40.0%	10.3%	12.7%	10.4%	4.4%	1.8%	100.0%
1986	21.7%	35.2%	14.1%	11.3%	11.7%	4.1%	1.9%	100.0%
1987	21.2%	33.7%	16.0%	10.3%	12.3%	4.8%	1.7%	100.0%
1988	21.6%	30.6%	18.0%	10.3%	12.5%	4.9%	2.1%	100.0%
1989	18.4%	33.2%	18.0%	9.9%	9.8%	8.6%	2.1%	100.0%
1990	25.2%	24.7%	22.4%	7.1%	8.9%	9.6%	2.1%	100.0%
1991	24.8%	23.1%	23.4%	6.1%	8.6%	12.2%	1.8%	100.0%
1992	22.8%	23.6%	23.6%	6.4%	8.7%	13.3%	1.6%	100.0%
1993	21.6%	22.2%	23.8%	6.2%	8.2%	15.5%	2.5%	100.0%
1994	20.3%	24.5%	23.6%	5.6%	7.6%	16.0%	2.4%	100.0%
1995	18.0%	24.9%	22.4%	5.5%	8.6%	18.1%	2.5%	100.0%
1996	16.2%	25.7%	21.0%	4.7%	9.3%	20.4%	2.7%	100.0%
1997	15.0%	24.3%	19.9%	4.7%	5.4%	22.2%	8.5%	100.0%
1998	12.5%	27.4%	17.8%	4.6%	6.8%	22.2%	8.7%	100.0%
1999	13.9%	25.3%	17.1%	4.5%	8.3%	22.0%	8.9%	100.0%
2000	12.9%	23.7%	15.3%	4.4%	9.1%	26.1%	8.5%	100.0%

The Class 2b trucks were split into two truck types - pickups and van/SUV using shares from the report *Investigation of Class 2b Trucks*, ORNL/TM-2002/49, Table 11, which are shown here in Table A25.

Table A.25
Shares of Class 2b Trucks by Truck Type

Truck types	Shares of class 2b truck population
Pickup	73.7%
Van/SUV	26.3%

Business fleet trucks - Bobit Publishing Company, Automotive Fleet Research Department, *Automotive Fleet Factbook 2000*, Redondo Beach, CA, 2001.

Personal trucks - Difference between total stock and business fleet trucks.

Sales - Domestic and import totals are from *Ward's Motor Vehicle Facts and Figures 2001*. Domestic-sponsored imports (captive imports) were included in the import figure only.

According to the *Investigation of Class 2b Trucks*, ORNL/TM-2002/49, 6.5% of all classes 1 and 2 truck sales were Class 2b trucks. Also, there were no class 2b trucks which were imported into the U.S. in 2000.

Domestic and import sales of trucks less than 8,500 lbs were distributed into size classes using the percentages in Table A26 from the ORNL MPG and Market Shares Database, 2002.

Table A.26
Light Truck Sales Shares by Size Class, 2000
for Trucks less than 8,500 lbs

Size class	Domestic	Import
Small pickup	14.4%	0.0%
Large pickup	26.4%	0.0%
Small van	16.5%	4.9%
Large van	4.9%	0.0%
Small SUV	5.9%	37.9%
Medium SUV	23.1%	52.4%
Large SUV	8.9%	4.8%

The Class 2b truck sales were split into two truck types - pickups and van/SUV using shares from the report *Investigation of Class 2b Trucks*, ORNL/TM-2002/49, Table 6, which are shown here in Table A27.

Table A.27
Shares of Class 2b Truck Sales
by Truck Type, 2000

Truck types	Shares of class 2b truck population
Pickup	82.1%
Van/SUV	17.9%

Fleet Vehicle Data

Light Fleet Vehicle Population

Automobiles - Bobit Publishing Company, *Automotive Fleet Factbook 2001*, Redondo Beach, CA, 2002, p. 12. Fleets of 10 or more units. Taxi and Rental categories were considered Business fleets.

Light trucks - Bobit Publishing Company, *Automotive Fleet Factbook 2001*, Redondo Beach, CA, 2002, p. 12. Trucks under 19,501 lbs GVW in fleets of 10 or more units. Light trucks were split from the total using shares from the 1997 VIUS (business, rental, and utility) and the GSA *Federal Fleet Factbook* (government) shown in Table A28.

Table A.28
Light Truck Share of Fleet Trucks
Less than 19,501 lbs GVW

Vehicles in Fleets of 10 or more	
Business	92.1%
Utility	89.6%
Rental	97.3%
Federal Government	81.6%

Light Fleet Vehicle New Sales

Automobiles - Bobit Publishing Company, *Automotive Fleet Factbook 2001*, Redondo Beach, CA, 2002, p. 40-48, Fleet 2000 Model Year registrations. New registrations are considered a proxy for new vehicle sales. Commercial and rental categories were considered Business fleets. Utility fleets were estimated as share of business fleet purchases based on data from the National Association of Fleet Administrators shown in Table A29.

Light trucks - Bobit Publishing Company, *Automotive Fleet Factbook 2001*, Redondo Beach, CA, 2002, p. 48-52, Fleet 2000 Model Year registrations. New registrations are considered a proxy for new vehicle sales. Commercial and rental categories were considered Business fleets. Utility fleets were estimated as a share of business fleet purchases based on data from the National Association of Fleet Administrators shown in Table A29.

Table A.29
Share of Business Fleet Vehicles
which are Utility Fleet Vehicles

Vehicle type	
Automobiles	2.6%
Passenger vans	7.3%
Cargo vans	64.3%
Sport utility vehicles	14.8%
Pickup trucks	66.2%

Light Fleet Vehicle Travel

Automobiles

Business

Bobit Publishing Company, *Automotive Fleet Factbook 2001*, Redondo Beach, CA, 2002, p.58-67. Average annual miles of compact and intermediate size automobiles were based on data from four leading fleet management companies. Weighted average of automobile travel was derived based on the estimated share of vehicles in the population from The Polk Company. Compact autos and smaller were assumed to travel as compact cars. Intermediate autos and larger were assumed to travel like intermediate autos. Average annual miles and weights are shown in Table A30.

Government

The only source of data on government fleet travel was for the Federal Government fleet vehicles. Data on sedans and station wagons from the GSA *Federal Fleet Factbook* was used for government fleet travel and is shown in Table A30.

Utility

The only source of data available on utility fleet vehicle travel was for the fleets of the Tennessee Valley Authority (TVA). Data on the TVA automobile fleet from the GSA *Federal Fleet Factbook* was used for utility fleet travel and is shown in Table A30.

Table A.30
Average Annual Miles and Population Shares
of Fleet Automobiles

	Average annual miles, 2000	Estimated share of vehicles in the population, 2000
Business automobiles		
Compact	22,689	55.6%
Intermediate	22,893	44.4%
Government automobiles		
Sedans and station wagons	12,895	
Utility automobiles		
Sedans and station wagons	13,399	

Light trucks

Business

Bobit Publishing Company, *Automotive Fleet Factbook 2001*, Redondo Beach, CA, 2002, p.58-67. Average annual miles of pickups, minivans, sport utility vehicles and full-size vans were based on data from four leading fleet management companies. Weighted average of light truck travel was derived based on the estimated share of vehicles in the population from The Polk Company. Average annual miles and weights are shown in Table A31.

Government

The only source of data on government fleet travel was for the Federal Government fleet vehicles. Data on ambulances, 2x4 trucks, and 4x4 trucks from the GSA *Federal Fleet Factbook* were used for government fleet travel. Weighted average of light truck travel was derived based on the estimated share of vehicles in the population from the same GSA report. Average annual miles and weights are shown in Table A31.

Utility

The only source of data available on utility fleet vehicle travel was for the fleets of the Tennessee Valley Authority (TVA). Data on the 2x4 trucks and 4x4 trucks in the TVA fleet from the GSA *Federal Fleet Factbook* were used for utility fleet travel. The weighted average of travel was derived based on the share of vehicles in the population from the same GSA report. Average annual miles and weights are shown in Table A31.

Table A.31
Average Annual Miles and Population Shares
of Fleet Light Trucks

	Average annual miles, 2000	Estimated share of vehicles in the population, 2000
Business light trucks		
Pickup trucks	28,515	48.8%
Minivans	25,677	17.1%
Sport utility vehicles	24,003	28.4%
Full-size vans	20,412	5.8%
Government light trucks		
Ambulances	5,946	0.5%
2x4 trucks	5,747	82.8%
4x4 trucks	12,022	16.7%
Utility light trucks		
2x4 trucks	10,405	55.5%
4x4 trucks	14,208	44.5%