

Chapter 9

Alternative Fuel and Advanced Technology Vehicles and Characteristics

Summary Statistics from Tables in this Chapter

Source		
Table 9.1	Alternative fuel vehicles, 2001	456,306
	<i>LPG</i>	269,000
	<i>CNG</i>	109,730
	<i>LNG</i>	2,039
	<i>M85</i>	16,918
	<i>E85^a</i>	48,022
	<i>Electric</i>	10,400
Table 9.4	Number of alternative fuel refuel sites, 2001	5,542
	<i>LPG</i>	3,403
	<i>CNG</i>	1,232
	<i>Electric</i>	693
Table 9.5	U.S. sales of advanced technology vehicles (through June 2002)	
	<i>Honda Insight</i>	9,955
	<i>Toyota Prius</i>	29,179

Fuel type abbreviations are used throughout this chapter.

LPG = liquified petroleum gas
CNG = compressed natural gas
M-85 = 85% methanol, 15% gasoline
E-85 = 85% ethanol, 15% gasoline
M-100 = 100% methanol
E-95 = 95% ethanol, 5% gasoline
LNG = liquified natural gas

^aDoes not include flex-fuel vehicles.



Alternative Fuels

The U.S. Department of Energy (DOE) defines alternative fuels as fuels which are substantially non-petroleum and yield energy security and environmental benefits. DOE currently recognizes the following as alternative fuels:

- methanol and denatured ethanol as alcohol fuels (alcohol mixtures that contain no less than 70% of the alcohol fuel),
- natural gas (compressed or liquefied),
- liquefied petroleum gas,
- hydrogen,
- coal-derived liquid fuels
- fuels derived from biological materials, and
- electricity (including solar energy).

DOE has established the Alternative Fuels Data Center (AFDC) in support of its work aimed at fulfilling the Alternative Motor Fuels Act (AMFA) directives. The AFDC is operated and managed by the National Renewable Energy Laboratory (NREL) in Golden, Colorado.

The purposes of the AFDC are:

- to gather and analyze information on the fuel consumption, emissions, operation, and durability of alternative fuel vehicles, and
- to provide unbiased, accurate information on alternative fuels and alternative fuel vehicles to government agencies, private industry, research institutions, and other interested organizations.

The data are collected for three specific vehicle types: (1) light vehicles, including automobiles, light trucks, and mini-vans; (2) heavy vehicles such as tractor-trailers and garbage trucks; and (3) urban transit buses. Much of the AFDC data can be obtained through their web site: www.afdc.doe.gov. Several tables and graphs in this chapter contain statistics which were generated by the AFDC.

DOE is sponsoring the **National Alternative Fuels Hotline** for Transportation Technologies in order to assist the general public and interested organizations in improving their understanding of alternative transportation fuels. The Hotline can be reached by dialing **1-800-423-1DOE**, or on the Internet at www.afdc.doe.gov/hotline.html.



There are more LPG vehicles in use than any other alternative fuel vehicle. The population of E85 vehicles, however, has grown the most since 1992. For details on alternative fuel use by fuel type, see Table 2.3.

Table 9.1
Estimates of Alternative Fuel Vehicles in Use, 1992–2001

Fuel type	1992	1995	1998	1999	2000 ^a	2001 ^a	Average annual percentage change 1992–2001
LPG	221,000	259,000	266,000	267,000	268,000	269,000	2.2%
CNG	23,191	50,218	78,782	89,556	100,530	109,730	18.9%
LNG	90	603	1,172	1,681	1,900	2,039	41.4%
M85	4,850	18,319	19,648	18,964	18,365	16,918	14.9%
M100	404	386	200	198	195	184	-8.4%
E85 ^b	172	1,527	12,788	22,464	34,680	48,022	87.0%
E95	38	136	14	14	13	13	-11.2%
Electricity	1,607	2,860	5,243	6,964	8,661	10,400	23.1%
Total	251,352	333,049	383,847	406,841	432,344	456,306	6.9%

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. (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.

^bDoes not include flex-fuel vehicles.



Nearly 90% of private alternative fuel vehicles are fueled by LPG and CNG. The Federal Government does not own many LPG vehicles; its alternative fuel vehicle fleet is split almost 50/50 between CNG and E-85 vehicles in 2001.

Table 9.2
Estimates of Alternative Fuel Vehicles by Ownership, 1996 and 2001

Fuel type	Private		State and local government		Federal Government	
	1996	2001 ^a	1996	2001 ^a	1996	2001 ^a
LPG	167,000	215,000	43,000	54,000	193	229
CNG	25,020	57,481	11,305	35,335	13,945	16,914
LNG	10	472	45	1,514	72	53
M-85	6,633	8,898	5,958	7,848	7,668	172
M-100	0	0	0	184	0	0
E-85	793	18,697	1,995	12,471	1,748	16,854
E-95	0	0	0	13	0	0
Electricity	2,451	4,643	487	4,977	188	780
Total	201,907	305,191	62,790	116,342	23,814	35,002

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. (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.



Table 9.3
Alternative Fuel Vehicles Available by Manufacturer, Model Year 2002

Model	Fuel	Type	Emission class
Daimler Chrysler: 1-800-999-FLEET			
Minivan	E-85 flex fuel	Minivan	LEV
Ram Wagon	CNG dedicated	Large wagon	ULEV/ILEV/CA SULEV
Ram Van	CNG dedicated	Large van	ULEV/ILEV/SULEV
Ford: 1-877-ALT-FUEL			
Ranger EV	Electric-lead acid	Small pickup	ZEV
Ranger FFV	E-85 flex-fuel	Small pickup	LEV
Explorer	E-85 flex-fuel	Sport utility vehicle	LEV
Crown Victoria	CNG dedicated	Large car	ULEV
E-Series	CNG dedicated	Wagon	ULEV/ILEV/SULEV
F-Series	CNG dedicated or CNG/LPG bi-fuel	Standard pickup	LEV/ULEV/ILEV/ SULEV
E-Series	CNG dedicated	Passenger van	ILEV/ ULEV/SULEV
Taurus	E-85 flex-fuel	Sedan & wagon	LEV
Think City	Electric	Two-seater	ZEV
General Motors: 1-800-25Electric, 313-556-7723 or 1-888-GM-AFT-4U (CNG)			
Chevy Silverado/GMC Sierra	CNG dedicated or CNG bi-fuel	Small pickup	LEV/ULEV
Chevy Express/GMC Savana	CNG bi-fuel	Cargo or passenger van	LEV
Chevy Cavalier	CNG bi-fuel	Subcompact	LEV
Chevy Tahoe/GMC Yukon	E-85 flex fuel	Sport utility vehicle	LEV
Chevy Suburban/GMC Yukon	E-85 flex fuel	Sport utility vehicle	LEV
Honda: 1-888-CCHonda			
Civic GX	CNG dedicated	Subcompact	ILEV/SULEV
Mazda: 1-800-222-5500			
B3000	E85 flex fuel	Standard pickup	LEV
Nissan: 1-310-771-3422			
Altra EV (CA fleets only)	Electric lithium-ion	Mid-size wagon	ZEV
Solectria Corporation: 1-508-658-2231			
Civitan	Electric-lead acid	Service van	ZEV
Toyota: 1-800-331-4331 (Press 3 for Alternative Fuel Information) (Fleet sales only)			
RAV4-EV (CA fleets only)	Electric-lead acid, NiMH	Sport utility vehicle	ZEV
Camry (fleets only)	CNG dedicated	Compact	ULEV

Source:

U.S. Department of Energy, National Alternative Fuels Data Center, web site, www.afdc.doe.gov/afvehicles.htm, January 2002.
(Additional resources: www.afdc.nrel.gov)

Note:

LEV=low emission vehicle. ILEV=inherently low emission vehicle. ULEV=ultra low emission vehicle. ZEV=zero emission vehicle. TLEV=transitional low emission vehicle. SULEV=super ultra low emission vehicle.



This list includes public and private refuel sites; therefore, not all of these sites are available to the public.

Table 9.4
Number of Alternative Refuel Sites by State and Fuel Type, 2001

State	CNG sites	E85 sites	LPG sites	LNG sites	Electric sites	Biodiesel sites	Total
Alabama	14	0	67	2	34	0	117
Alaska	0	0	8	0	0	0	8
Arizona	30	1	108	3	51	2	195
Arkansas	7	0	73	0	0	0	80
California	213	0	336	9	426	3	987
Colorado	39	7	91	1	2	0	140
Connecticut	25	0	29	0	1	0	55
Delaware	4	0	4	0	0	0	8
District of Columbia	3	0	0	0	1	0	4
Florida	40	0	144	1	3	0	188
Georgia	67	0	53	2	82	0	204
Hawaii	0	0	7	0	3	1	11
Idaho	8	1	33	0	1	0	43
Illinois	22	15	80	0	2	0	119
Indiana	32	1	48	3	1	1	86
Iowa	0	11	42	0	0	0	53
Kansas	5	1	64	1	0	0	71
Kentucky	6	7	23	0	0	0	36
Louisiana	14	0	32	0	0	0	46
Maine	0	0	19	0	0	1	20
Maryland	30	1	28	2	1	0	62
Massachusetts	12	0	37	0	25	0	74
Michigan	31	8	125	1	6	2	173
Minnesota	11	67	61	1	0	0	140
Mississippi	3	0	32	0	0	0	35
Missouri	7	5	147	0	0	1	160
Montana	9	2	42	1	0	0	54
Nebraska	5	7	29	0	0	0	41
Nevada	18	0	36	0	0	1	55
New Hampshire	1	0	30	0	1	0	32
New Jersey	30	0	31	0	0	0	61
New Mexico	15	1	88	1	0	0	105
New York	62	0	99	0	16	0	177
N. Carolina	10	0	77	0	6	0	93
N. Dakota	4	2	18	0	0	0	24
Ohio	52	2	73	1	1	1	130
Oklahoma	58	0	99	0	0	0	157
Oregon	16	0	50	1	2	0	69
Pennsylvania	55	0	107	1	1	0	164
Rhode Island	6	0	7	0	0	0	13
S. Carolina	4	1	61	0	1	1	68
S. Dakota	2	8	26	0	0	0	36
Tennessee	2	0	60	0	0	0	62
Texas	66	0	442	7	2	1	518
Utah	62	2	36	1	0	0	101
Vermont	0	0	17	0	7	0	24
Virginia	24	1	64	3	11	0	103
Washington	25	0	89	1	6	1	122
W. Virginia	43	0	10	0	0	0	53
Wisconsin	22	3	84	0	0	0	109
Wyoming	18	0	37	1	0	0	56
Total	1,232	154	3,403	44	693	16	5,542

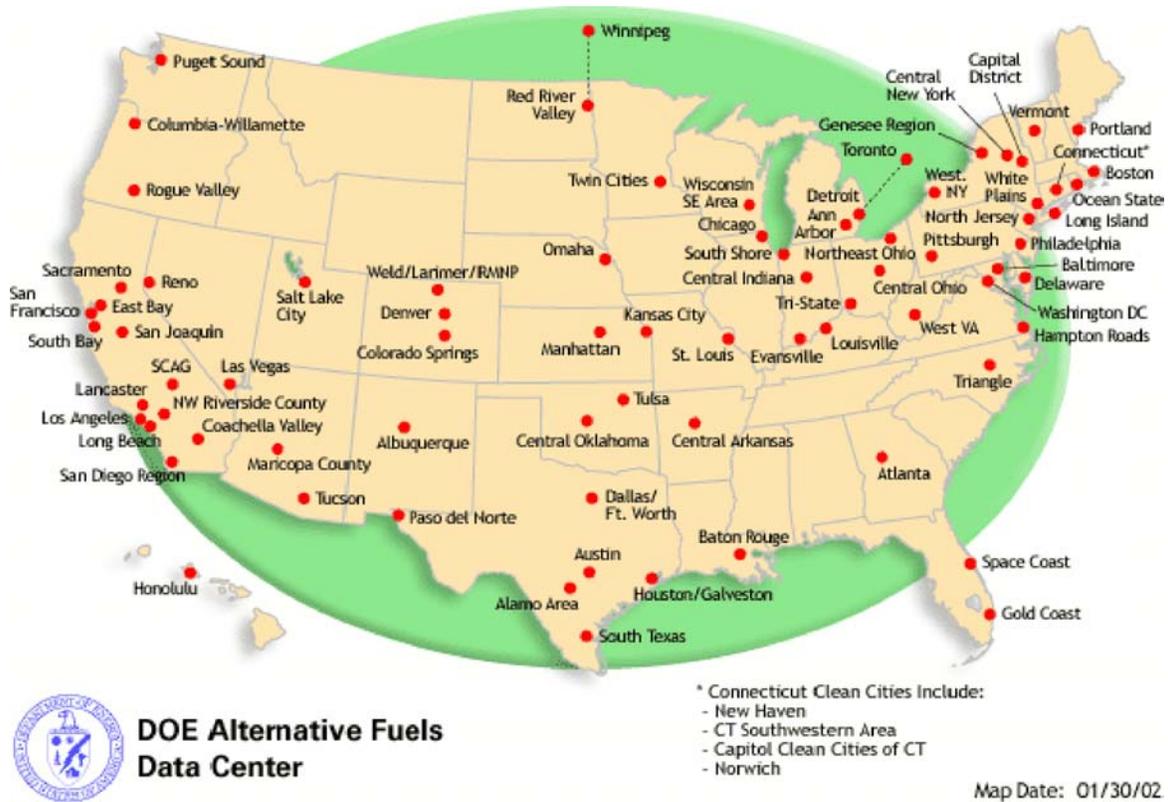
Source:

U.S. Department of Energy, Alternative Fuels Data Center web site, www.afdc.doe.gov/refuel/state_tot.shtml, March 2002.



Clean Cities is a locally-based government/industry partnership, coordinated by the U.S. Department of Energy to expand the use of alternatives to gasoline and diesel fuel. By combining the decision-making with voluntary action by partners, the "grass-roots" approach of Clean Cities departs from traditional "top-down" Federal programs.

Figure 9.1. Clean Cities Coalitions



Source:
U.S. Department of Energy, Alternative Fuel Data Center, July 2002.
(Additional resources: www.ccities.doe.gov)



The Honda Insight, Civic Hybrid and Toyota Prius are the three advanced technology vehicles which are currently available to the public in the U.S. They are hybrid vehicles, using both electricity (from batteries) and mechanical power (from a small internal combustion engine). Learn more about DOE's hybrid vehicle program at: www.ott.doe.gov/hev.

Table 9.5
Sales and Specifications of Available Advanced Technology Vehicles

	Honda Insight^a	Toyota Prius	Honda Civic Hybrid
Fuel economy (city/hwy)	57/56 mpg	52/45 mpg	46/51 mpg
Fuel tank capacity	10.6 gal.	11.8 gal.	13.2 gal.
Acceleration (0-60 mph)	11.3 sec.	12.8 sec.	10.9 sec.
Emissions	SULEV	SULEV	ULEV
Aerodynamics	0.25 Cd	0.29 Cd	0.34 Cd
Curb weight	1,964 lbs.	2,765 lbs.	2,732 lbs.
Passenger capacity	2	5	5
Dimensions:			
Length	155.1 in.	169.6 in.	174.8 in.
Width	66.7 in.	66.7 in.	67.5 in.
Cargo Capacity	16.3 ft ³	11.8 ft ³	10.1 ft ³
Price	\$21,280	\$20,480	\$19,550
Calendar year sales in the U.S.			
1999	17	0	0
2000	3,788	5,562	0
2001	4,853	13,568	0
2002 (January–June)	1,297	10,049	^b
Total	9,955	29,179	^b

Source:

Manufacturer's web sites: www.honda2001.com/models/insight and prius.toyota.com.
Sales data - Ward's Communications, Inc., *Wards Automotive Reports*, Southfield, MI, 2002.

^aSpecifications are for the continuously variable transmission. The Insight is also available with manual transmission.

^bSales for the Civic Hybrid are not shown separately from other Civic models.

